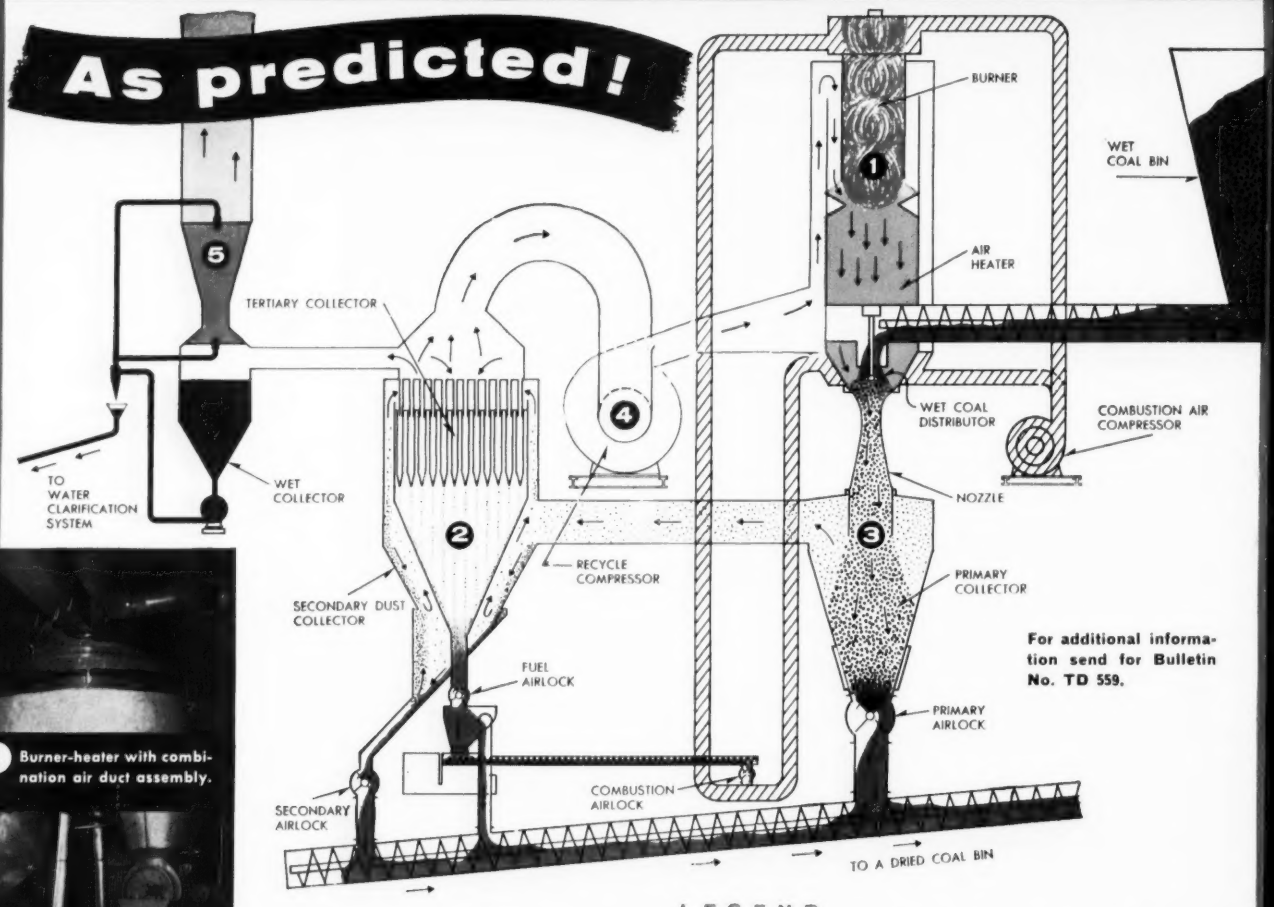
Gorgas Builds
For the Future

• • • p 70

COAL AGE

MARCH 1960 PRICE $1
A McGRAW-HILL PUBLICATION

As predicted!



For additional information send for Bulletin No. TD 559.

LEGEND

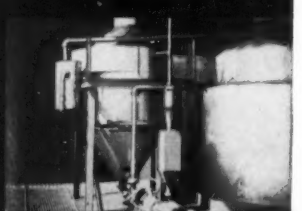
Large Size Coal (majority of product)	Fine Dust	Extreme Fine Dust	Outside Air (atmosphere)	Flame in Burner	Heated Gas	Recycled Gas	Completely Scrubbed Gas Exhausted to Atmosphere	Partially Scrubbed or Cleansed Gas	Coal	Water Containing Extreme Fine Dust

1 Burner-heater with combination air duct assembly.

2 Lower section of secondary dust collector at left;

3 Primary collector with airlock at upper right; and clean coal collecting conveyor.

4 Recycle compressor and upper section of secondary dust collector.



5 Wet collector and exhaust duct for scrubbed gas.

LESS HP = $$ SAVED
MORE BTU = BETTER PRODUCT

FAIRMONT-built TAILOR STREAM-FLO THERMAL DRYER*

The new Tailor Stream-Flo Thermal Dryer dries feed products up to 2"; recovers the finest dusts. Product is conveyed through drying chamber by gravity, thereby using much less horsepower.

The Tailor Dryer produces a dried product with 200-300 BTU per pound higher heating value compared to other dryers because of the lack of oxidation within the drying atmosphere.

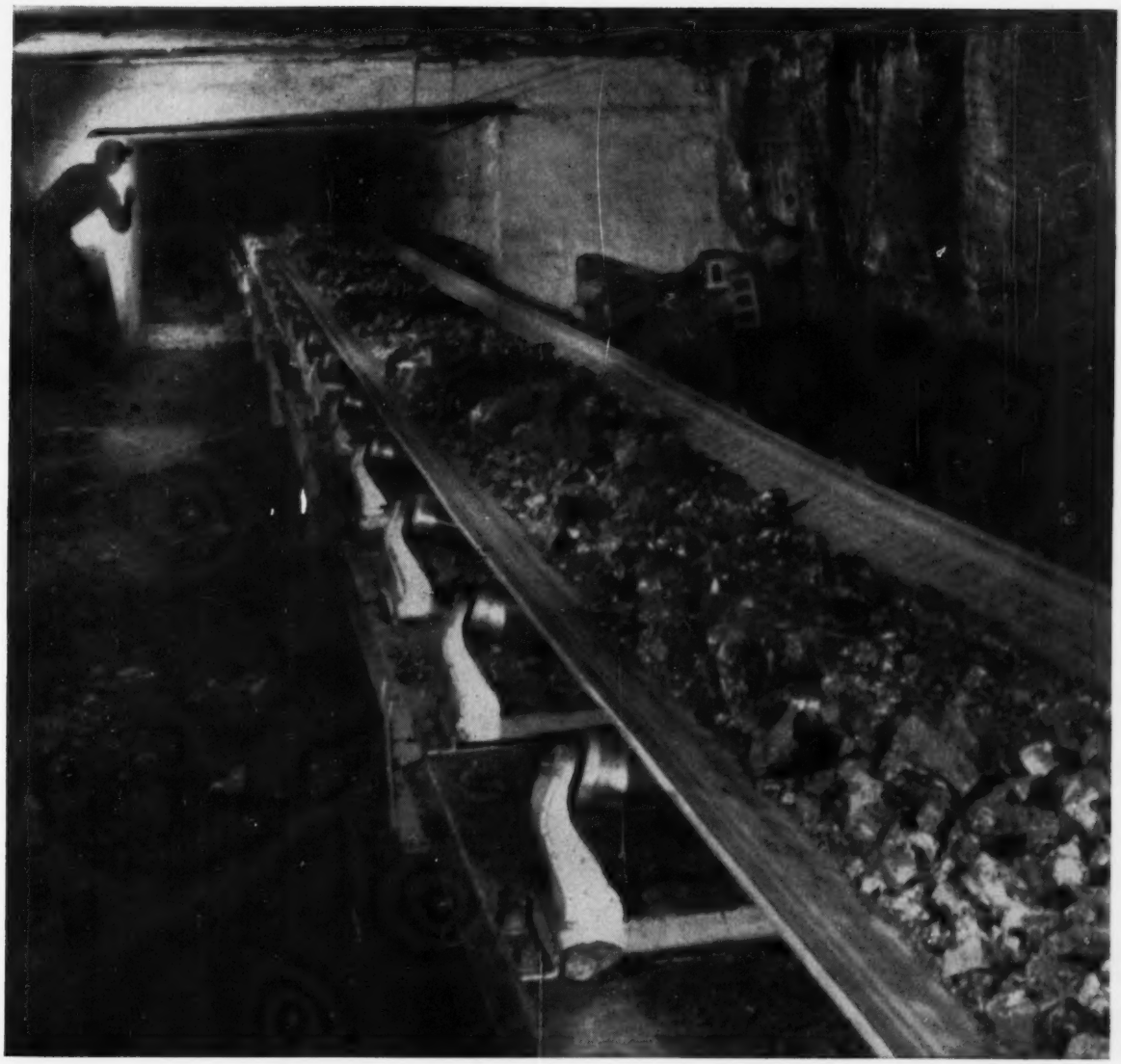
The compact, low maintenance assembly comprises only five major elements in its entire system!

*Tailor Stream-Flo Thermal Dryer is the trade name for thermal dryers of Tailor & Co., Davenport, Iowa.

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

ENGINEERS • DESIGNERS • FABRICATORS and CONSTRUCTORS



Mine gets added safety at no sacrifice in belt life

OPERATORS of this West Virginia mine figure the belt pictured above is saving them $5400 a year. It's a B.F.Goodrich belt made with fire-resisting rubber. Because this belt won't support combustion or spread fire, ventilation stoppings are not required in the cross ducts along the belt line. The mine owners estimate that they save the cost of 60 such walls a year at $90 each.

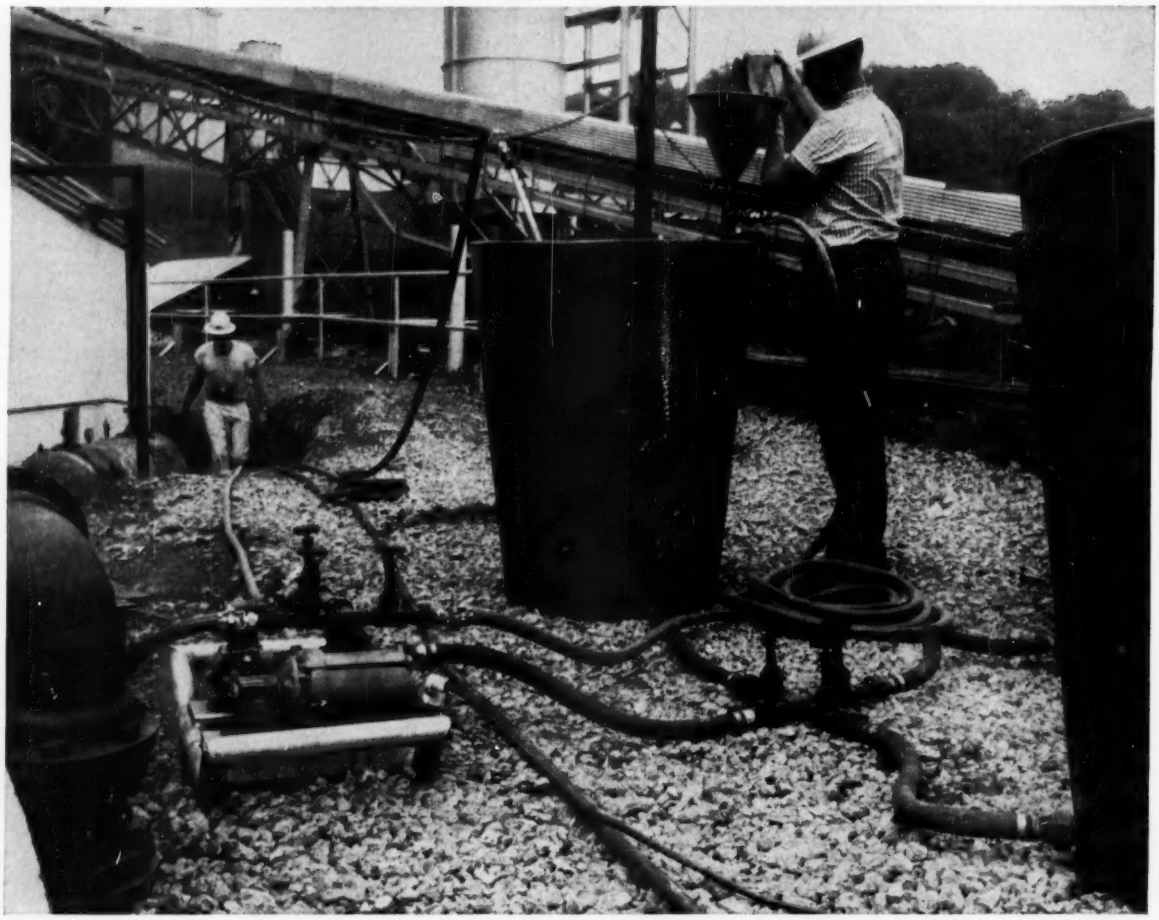
In addition to this saving, engineers expect the belt to at least equal —and probably surpass—the long service records made by other B.F. Goodrich Caricoal belts in underground mines. That's because the special fire-resisting rubber used in the belt also has high resistance to oil, grease, acid water—and the cutting, gouging and impact of coal.

As you can see, the BFG belt troughs well, too. Because it's so flexible, it can carry coal at high speed without spilling a lot of it along the way.

Before you buy another conveyor belt, look into the safety and other cost-cutting advantages you can get with B.F.Goodrich fire-resisting belts. They've been accepted for listing as fire-resistant by The Bureau of Mines (Acceptance No. 28-6). Your B.F. Goodrich distributor can give you details, or write *B.F.Goodrich Industrial Products Co., Dept. M-812, Akron 18, Ohio.*

B.F.Goodrich

SEPARAN AP30



This Equipment Takes the Risk Out of Trying Separan AP30 For Flocculating Coal Fines

Using this test equipment, engineers of the Dowell Division of The Dow Chemical Company can demonstrate how Separan AP30® can help coal producers reduce the cost of coal-washing operations.

Separan AP30 was developed by Dow for the flocculation of coal and slimes. An anionic polymer, it offers many advantages over earlier materials.

However, since it is completely different from earlier agents, different application techniques are required. Many operators have been reluctant to go to the expense of setting up experimental mixing and proportioning systems.

Now there is no more risk of excessive experimental costs. Dowell can move in equipment like this, mix Separan AP30, and proportion it into the washing system. Quickly, Dowell engineers can tell how much Separan AP30 is required and how it can be fed to best advantage.

The operator can tell — in advance — how much he can save by using Separan AP30. He can also experimentally determine the feed points that will give optimum results.

At this stage, risk of loss is negligible. He can then install a simple feed system with confidence of success.

Separan AP30 is available from Dowell stations in the major coal-producing areas of the United States. For more information or consultation, contact the Dowell District office at 1918 Highway 41 North, Evansville 7, Indiana. The telephone number is HArrison 5-1353. Upon request, a Dowell Engineer will call promptly, without cost or obligation.

Services to the coal industry

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

Frank F. Kolbe, Chairman of the Board of The United Electric Coal Companies, developer of the "big wheel."

The "big wheel" has muscles of Yellow Strand Wire Rope

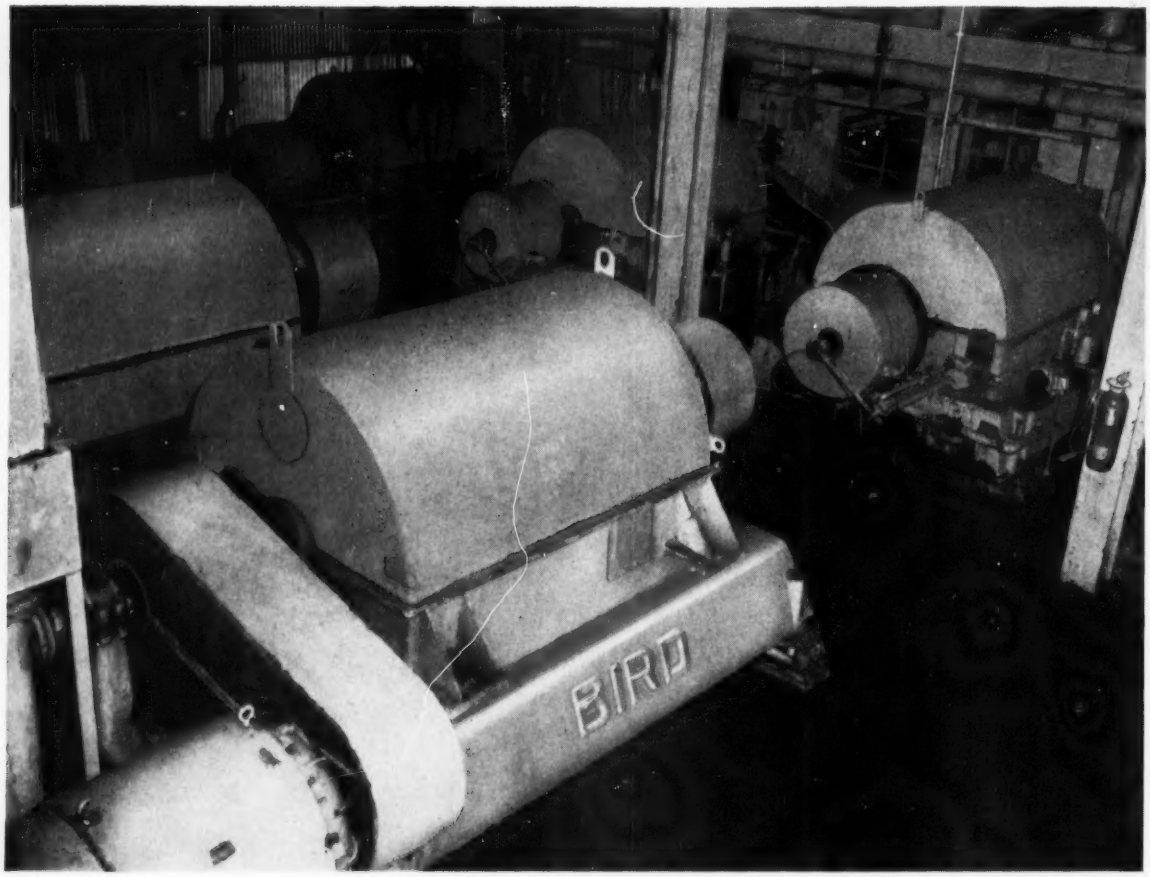
This is the Kolbe Wheel Excavator now in operation at United Electric Coal Co.'s Cuba Mine near Canton, Illinois. It is the largest earthmoving machine ever built in America. The giant digs and moves 3,500 cu. yds. of overburden per hour, in a continuous stream, a maximum distance of 420 feet.

Muscles for the business end — the giant wheel — are Yellow Strand Wire Rope. It was specified for raising and lowering ladder and stacker, and must carry the 476,000 lb. wheel and ladder. It is subjected to the impact of 1½ ton boulders dropping 10′ or more, and the constant vibration of continuous operation.

It will pay you to entrust your critical loads to Yellow Strand, too! Contact your B & B Distributor for complete details. Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Missouri.

Yellow Strand®

WIRE ROPE SLINGS CLIPS



THESE SIX BIRDS ARE DEWATERING THE TABLE-CLEANED COAL IN A BIG PREPARATION PLANT RUN BY A SINGLE OPERATOR

Running this very large plant in northern West Virginia with only one man means equipment that can take care of itself every minute of the day — day in and day out.

Bird Continuous Coal Centrifugals are *that* kind of equipment. That's why you find them at this and so many other big, modern preparation plants.

For dewatering coal from tables, nothing is so reliable, so efficient, so economical as the Bird Solid Bowl Centrifugal.

Bird builds both Screen Type and Solid Bowl Type Coal Centrifugals — is therefore in a position to make unbiased recommendations. Ask for layouts and estimates.

BIRD
MACHINE COMPANY

SOUTH WALPOLE, MASSACHUSETTS
Regional Offices:
EVANSTON, ILL. • ATLANTA, GA. • HUNTINGTON, W. VA.
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This Month in COAL AGE

MARCH, 1960

Features This Month:

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► Deep Mining, Stripping, Maintenance

Gorgas Builds For The Future ..... p 70

Latest results of long-range planning at Alabama Power include the new No. 7 slope mine which is scheduled to produce better than 2,000,000 tons per year from the American seam, stripping and augering in the American and Pratt seams. Two continuous miners teamed with pickup loaders and shuttle cars advance five of the main headings while a loader-conveyor team drives three additional headings. Continuous miners average 560 tons per shift and loader-conveyor output averages 546 tons. Coal flows to the surface over a network of belt conveyors. Stripping and augering add over 1,500 tpd to Gorgas production. Regular rebuilding of all mining equipment plus unit assembly replacement keep total underground delays under 10%.

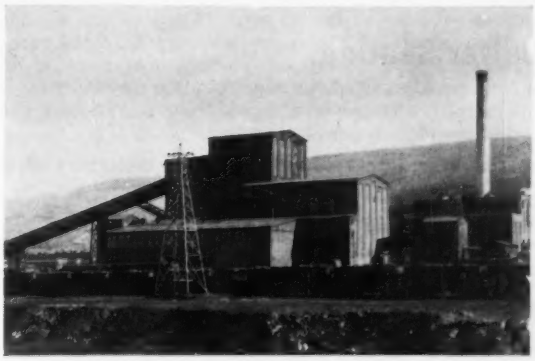
In the Spotlight—Mining plans; how 150-grain detonating fuse serves as primer in ammonium nitrate strip blasting; rebuilding schedule for mining equipment.

► Roof Safety

Unless ..... p 82

A plan for effective roof-fall prevention requires gathering of facts, determination to attain the desired ends, and real management backing. Training and conditioning of supervisors and workmen, following an intensive sales job to gain participation, will help to assure desirable results. Momentum can be maintained in the program through the use of incentives and constant management pressure. Basic to success are effective methods, materials and equipment.

Valuable Aid—Full description of methods and goals in National Campaign to Reduce Frequency of Roof-Fall Injuries.



► Success Story

New Management Fires Glen Alden Recovery ..... p 88

W. A. Raleigh Jr., Associate Editor, *Coal Age*

In the past 2 yr, a new production and sales management philosophy has lifted the Nation's largest hard-

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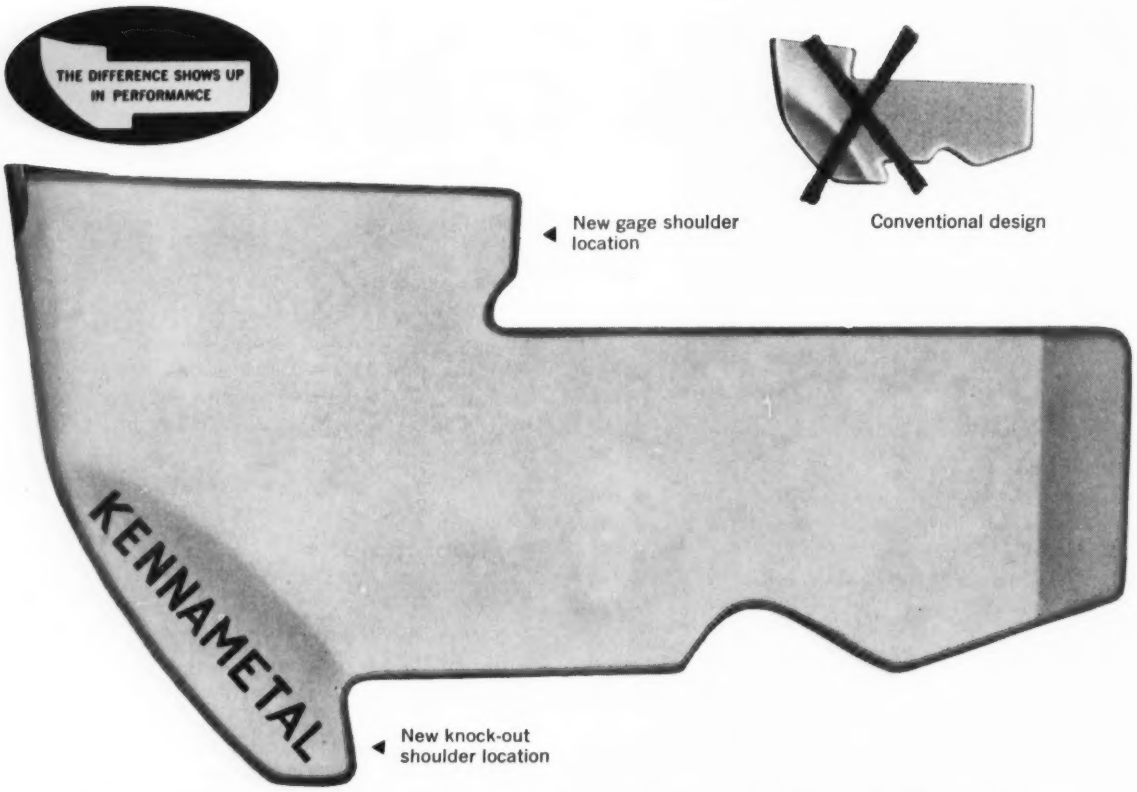


KENNAMETAL U17 SERIES CUTTER BITS

with new gage shoulder location . . . another step toward smoother production

Better Seating

- New positioning of the gage shoulder gives greater tool rigidity. The rubber keeper is subjected to much less flexing than in other designs . . . keepers last longer.
- "Pounding" that causes wear and distortion of bit blocks is minimized.
- Held firmly against the work, the U17 gives more positive cutting action. Reduced strain on the shank protects the carbide cutting tip.

Stronger Design

- Greater minimum-cross-section through head of the bit provides greater strength than other designs.

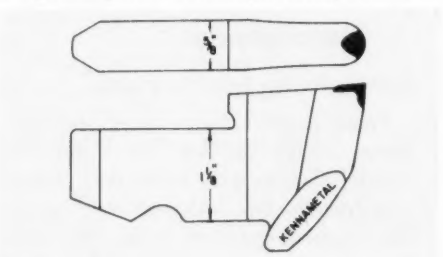
Easier to Change

- New positioning of the knock-out shoulder provides better leverage for bit removal. Bits come out easier, faster . . . saves you time, money.

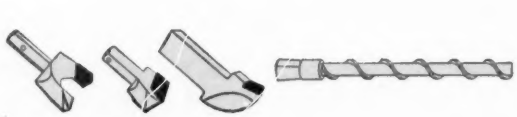
97274

The new U17 Series Cutter Bit is available in all three standard tip styles. Ordering designations are: U17—Full Nose Radius (open face) Carbide Tip . . . U17R—Recessed Tip . . . U17RA—Cylindrical Plug (illustrated above).

Let the Kennametal difference show up in performance. Test this new Kennametal design in your mine. Call your Kennametal Representative or contact us direct. KENNAMETAL INC., Mining Tool Division, Bedford, Penna.



INDUSTRY AND KENNAMETAL
...Partners in Progress



coal producer out of the pits of despair and put it on the road to solid recovery, growth and profit. Resurgence has been achieved by upscaling company-mined tonnage, by improving mining and preparation efficiencies, and by a more imaginative, aggressive approach to marketing.

New Talent in Profile—"Chief Architect and Corporation Boss;" Glen Alden Coal's Top Staff.

► Maintenance Ideas

Better Motor Maintenance and Field Testing . . . . . *p 96*

L. L. Lipanye, Reliance Electric & Engineering Co., Cleveland, Ohio

An effective motor maintenance program requires a knowledge of standard motor tests and tolerances. Sources of information on this subject are not always available to the field repairman. A better understanding of test procedure and the use of motor data and instruments will simplify many of the problems associated with a motor-maintenance program.

Tips on Belt Conveyor Maintenance . . . . . *p 100*

J. R. Brandon, Service Manager, Hewitt-Robins Incorporated

Belt conveyors are highly efficient and relatively trouble-free when properly designed and maintained. By following rules and procedures which have been proven by experience to be sound, you can expect a smooth-running conveyor operation with few or no emergency breakdowns.

Guides—Lists of checkpoints for better maintenance and operation of idlers, pulleys, lubrication and the belt itself.

► Ventilation

Brattice Cloth Efficiency . . . . . *p 107*

James J. Scott, Instructor, Dept. of Mining and Metallurgy, University of Wisconsin, Madison, Wis.

L. K. Marshall, Mining Engineer, American Brattice Cloth Corp., Warsaw, Ind.

Laboratory tests on leakage through brattice cloth followed by field studies on applications at Enoco Collieries, Inc., show that Standard-Treated No. 3 Jute and double-warp cloths are effective air barriers. Efficiency depends primarily on a workmanlike installation.

Highlights—Graphic comparison of different grades of cloth; diagrams of underground installations.

This Month in COAL

MODEST START—Various forecasts have placed 1960 bituminous output at from 430 to 460 million tons. The actual, of course, will not be known until the year is over, but the results in recent weeks would seem to indicate that the lower rather than the higher figure is the more realistic. After some fairly good gains in the first weeks of January, production dropped until it was only slightly ahead of figures for 1959. With no bulge in demand in sight and consumers' stocks back to normal there is little prospect of a surge in output in the first half. However, even though plus 9-million weeks are likely to be few, bituminous should gain in relation to 1959, making the picture look better as time goes on and improving the prospects of reaching at least the minimum forecast.

OPPOSITE FOR ANTHRACITE—In contrast with the opening weeks of 1959, when the industry benefited from quite cold weather, anthracite in 1960 has been considerably off, reflecting a drop in degree days and consequent cut in demand for heat, as well as the usual competitive attrition. On the basis of the early weeks the loss in 1960 could be a whopping one. However, it still is a little early, in view of the vagaries of the weather, to present this as a firm conclusion, though it also must be admitted that with the start that it has, the industry is again in line for another loss unless something not now foreseeable changes the picture radically.

COMPETITION FROM ABROAD—Unless something unforeseen comes up later it appears that the government's attempt to limit residual imports is beginning to actually accomplish that end. For the first time in quite a while the total has been no more than in the corresponding previous period. And in addition to government restriction the 50c cut in freight rates for major tonnages to big users has been approved by an ICC examiner, leading to the conclusion that commission action will make it final. It should accelerate the trend toward adjustments to retain volume business and thus benefit both coal and the carriers in the oil battle, particularly along the Atlantic Coast.

The gas picture is a little different—primarily because the stage is being set to release Canadian production for U.S. use in practically unrestricted volume. The Canadian Energy Board has shown little disposition to consider the representations of U.S. coal men, and other possible roadblocks are being removed. The pressure will increase, with the big unanswered questions as "How soon?" and "How much?" Both turn, in large part, on the answer to the basic question of the price at the user's plant. Coal's chances still are good on this basis.

RESEARCH RESURGENT—1960 could be the year that people will look back at as the start of the real research era in coal, both production and utilization. For one thing passage and final approval of a new coal-research bill would put the government much more heavily into the picture. More important both coal companies and coal users, as well as other organizations, are stepping up their efforts. Thus greater progress is being made toward a research level measuring up to industry needs, in turn giving it more leverage in selling against competition as well as opening up opportunities in new markets.

Hold fast in mine roof

To:
Mr. Charles Maynard
Mine #3

Chuck:

This is the shell I talked to you about last week at the mine. Roof bolting is right up O-B's alley... they pioneered the use of expansion units... probably know more about them than anyone in the field. I suggest you get in touch with their local sales engineer. I've found Ohio Brass people are glad to work right with you in the mine.

Regards.
Jack

Ohio Brass 4-Way Expanding Anchors hold in both soft shale and hard rock

- **GO UP FAST** . . . 4-way expansion begins with the first turn of the wrench.
- **DEVELOP TOP HOLDING POWER** with easy wrenching effort . . . 150 "foot pounds" of torque gives bolt tensions of 9000 pounds.
- **WORK IN CLOSE QUARTERS** . . . O-B engineers developed these anchors underground. Personal knowledge of mining problems enabled them to design units that are especially suited to your needs.
- **GET SERVICE** for your roof bolting problems . . . see your local Ohio Brass engineering representative or write Ohio Brass Company, Mansfield, Ohio.

O-B Bail Type Expansion Shell and Plug

Ohio Brass (B) HOLAN

EXPANSION SHELLS AND PLUGS • LINE MATERIALS • SAFETY AND CONTROL EQUIPMENT • ELECTRIC HAULAGE MATERIALS

► Machine Selection

How to Choose a Wheel-Mounted Loader . . p 116

Wheel-mounted loaders in the past 15 yr have grown from primarily agricultural machines to become highly regarded and widely used. Selection of the most productive wheel-mounted loader should be based on: (1) production required; (2) productive ability of the loader; (3) price and quality; and (4) service available and trade-in value. Important specifications to study include bucket capacity, lifting capacity, bucket operating speed, engine power rating, physical size and weight, and work and travel speeds.

Extras—Tables showing comparative specifications for 2- to 2½-yd units.

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This Month in Mining Practice

RAIL RETURN?—Rail in the pit or on the highwall for direct loading of coal has been unknown in stripping for some years, so it is somewhat of a surprise to learn that it actually is being given serious consideration in the design of one new stripping operation. It is not yet a certainty that it will be installed but it is giving the truck a tussle. However, rail probably isn't going to seriously challenge trucks in service to the pit but the fact that it still is interesting enough to consider—if only in one instance—is an event worth noting.

COALBROOK AND U.S.—Aside from the fact that the Coalbrook disaster in South Africa, with 435 deaths, displaces the U.S. from its runner-up position in the disaster-toll column (China is first with 1,549 and Monongah is now third with 361) it should be marked by coal men here for the simple reason that it is an indication that many lives can still be lost—IF the necessary precautions are not taken. The U.S. had only two disasters in 1959, with a toll of 21 men, and wound up with a fatality rate (all causes) of 0.68—best in history. So far in 1960, though there are some sour spots, the industry is improving on its record. But Coalbrook, an explosion in Japan and other disasters elsewhere are grim notice that a letdown here in these United States will have its inevitable result.

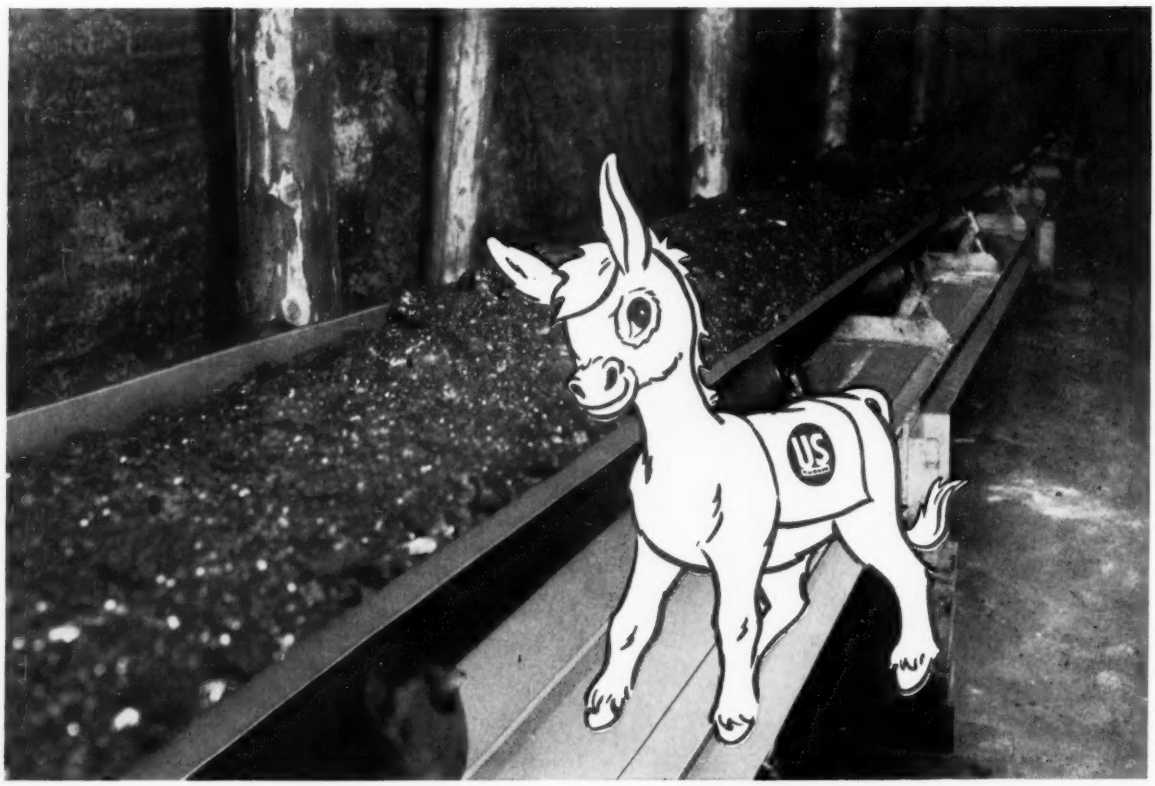
PLASTIC AND RUBBER—Hose and pipe are two common examples of the use of plastics in preparation. Newer uses involve, among other things, a plastic cover laid over dried coal in the car to keep it from picking up moisture from rain. A new rubber application is protecting perforated plate, with some going even farther and using rubber only in screen-surface construction. And in tires, pump impellers and the like, a new type of rubber, called urethane, is reported to be giving greatly increased life in initial field tests.

SILICA COMEBACK?—AC continues to take over more and more of the underground mine operations, but DC still is a major factor and will remain one for some time. So the need for conversion equipment continues. It now looks as if the silicon rectifier, which got hot and then cooled off a few years ago, is now working on a comeback. Presumably designers are licking the problems encountered with the first units. If they have—and recent activity seems to bolster this conclusion—the number of silicon rectifiers is due for an increase.

COMING UP—The 1960 Coal Convention of the American Mining Congress will open its doors in Pittsburgh May 9. Eleven technical sessions will cover the development of a national fuels policy, thin- and thick-seam mining, underground haulage, underground power, stripping, coal preparation, safety, and management and cost controls. An added event is a one-day tax forum. Topics will range from hydraulic mining to the use of electronic computers in addition to the general classes of material previously listed. Fun, too.

BURRO CONVEYOR BELT

INTRODUCING THE BURRO



The First PERFECTED interwoven coal mine belt!

Like its namesake, U.S. Burro® Conveyor Belt needs no coddling. It's tough—all the way through. This INTERWOVEN belt has been perfected with the mine operator in mind and offers these features:

a) Exclusive engineered stretch control, **b)** any cover thickness available, **c)** widest operating temperature range, **d)** highest edge and lengthwise rip resistance. **e)** Excellent fastener holding ability, **f)** perfect troughability for easy training, **g)** lowest cost.

This perfected U.S. Burro interwoven coal mining belt is ready for you now at your United States Rubber Distributor. He has *the complete line* of "U. S." materials-handling belts.

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

The Coal Commentator

World's Longest

The "Land Down Under," otherwise Australia, now claims the distinction of operating the longest single belt conveyor in the world. The property is the Coal Cliff mine, south of Sydney, which, like many of its U.S. counterparts, is being modernized at an ultimate cost of £4,500,000 for a production of 3,000 tons per day from six U.S.-type continuous miners cleaned in a U.S.-type washing plant.

The belt is a cable unit, from Scotland, where this type of transporter was developed. Initial length was 10,600 ft, later extended to 12,500. Lift is 680 ft, width is 42 in, maximum capacity is 560 tph and final drive horsepower is 900.

No cable belt is so far in operation in the U.S., though a slope unit in Nova Scotia has been giving satisfactory service for some years. Perhaps, though, this situation will change soon. In fact it probably should in the light of experience in other countries since the Scots pioneered the idea.

Helpful Step

In view of declining college enrollments in the face of growing needs for engineering talents the new Pennsylvania-industry program represents a major forward step. Under it boys selected by the university Dept. of Mining or by cooperating companies can get a degree in 5 yr. The first four are evenly divided between working for the sponsoring companies and attending school. The fifth is completely school.

Several highly successful schools operate on this basic principle, though Penn State is the first in mining. The problem of financing education is eased and school becomes more meaningful as a result of on-the-job experience.

Some 3 yr ago (March, 1957) Coal Age published the results of a survey of engineering employment and future needs. These latter were substantial and still have not been met. The Penn State program will help—and installation of similar programs at other institutions merits sincere study.

One per Hundred?

Checking the flowsheets of plants featured in *Coal Age* in the past 3 or 4 yr leads to the informed guess that one vibrating screen is installed for every 75 to 100 tons of hourly bituminous-plant capacity, and perhaps one shaker for every 1,000 tons. Probably more than half the recent plants have no shakers at all.

On this basis, probably more than 20,000 vibrators and 2,000 shakers are in service at bituminous plants, with quite a few more shakers and some vibrators in anthracite. In spite of this, one wonders if the industry has made all the progress it could reasonably expect in efficient screening at minimum cost. Among the possible opportunities are increased realization through better preservation of size value —a function of accuracy; also reduced maintenance of the screening machine and lower costs for plate, cloth, bar, rod, etc.

Since sizing, dewatering and other operations involving screens are going to be with us for a long time to come, the screen and its operation merits more than merely perfunctory attention.

Coal Possibility?

"Man bites dog" in its many variations is a theme that always gets reader attention. One of the variations that perhaps points a moral was personally experienced by your commentator in January. The event was a party put on by a city to honor a manufacturing concern.

The city was Escanaba, Mich.—"Truck Crane Capitol of the World." The company was the Harnischfeger Corp. which, among other products, makes mighty fine strip shovels. For 18 hr of speeches, fireworks, parades and other activities calculated to gladden the hearts of the recipients Escanaba made known the fact that it had benefitted from the location of Harnischfeger facilities there and that it was glad that it had been favored.

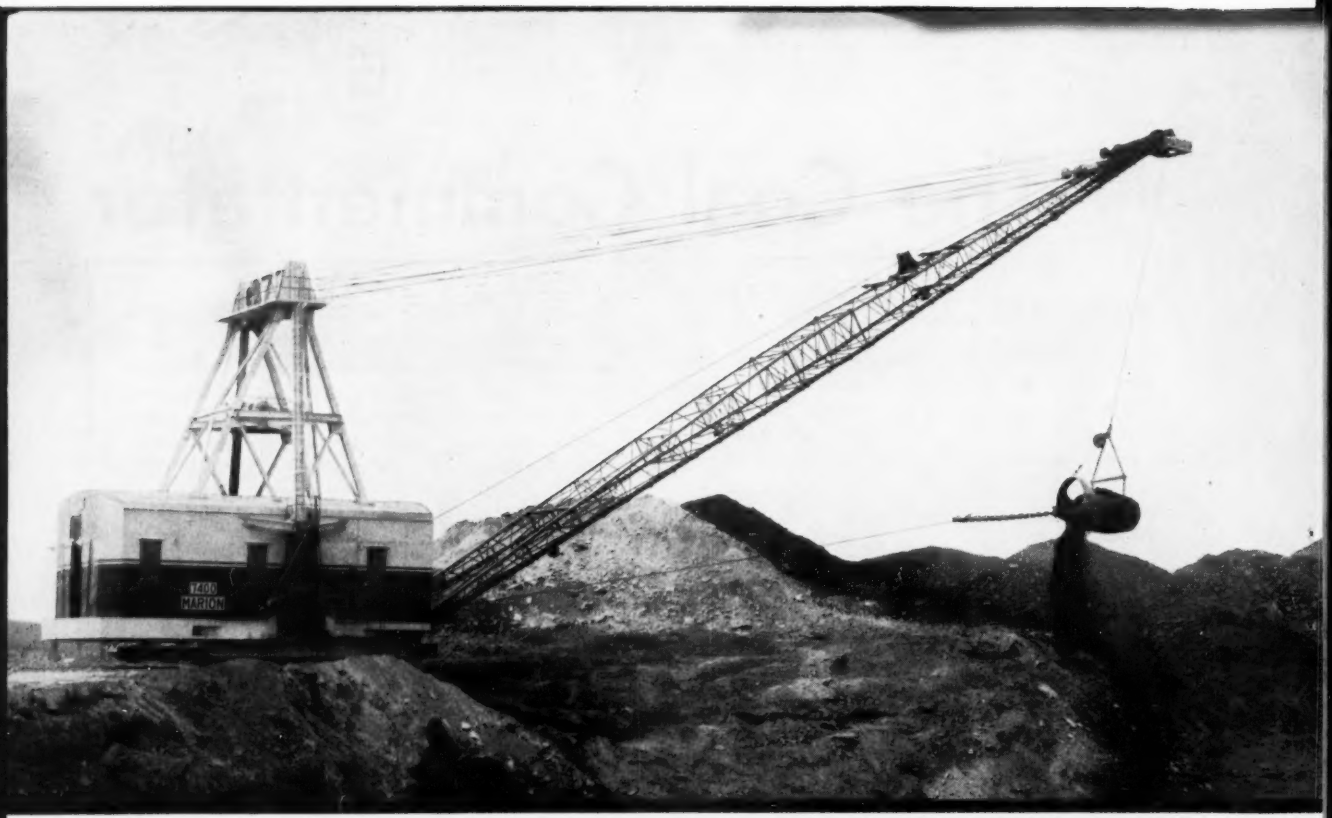
The occasion was, in the true sense of the word, unique. It leads one to wonder—somewhat wistfully perhaps—if some coal company might not be similarly honored by some community in the future.

Seventy-Five for P&M

Seventy-fifth anniversary celebrations are, as one might quickly conclude, rather few in number, even for corporations. But they do occur and this is the year for the Pittsburg & Midway Coal Mining Co.

Pittsburg & Midway's early operations were in the Pittsburg, Kan., area, where stripping with teams, plows and scrapers started in 1876, with a steam shovel appearing in 1877. This marked the beginning of a change from exclusively deep to almost completely strip recovery in the area, with Pittsburg & Midway a leader in the movement. As a leader, the company naturally was a pioneer in the development of equipment and methods. And of course it was one of the group of strippers that stayed in there and battled until they whipped the industry's biggest problem—that of getting market acceptance of its product.

On all counts, therefore, Pittsburg & Midway rates the coal industry's top salute and all its good wishes for the future.



Marion Type 7400 with 13 yard bucket on 175 ft. boom in Eastern Ohio.

MARION STRIPPERS OFFER...

Lower Costs per yard ...Over the years!

Coal stripping is big business, requiring big machines and equally big annual yardage output. Often pennies per ton of coal separate the successful strip mining operation from the "also-ran."

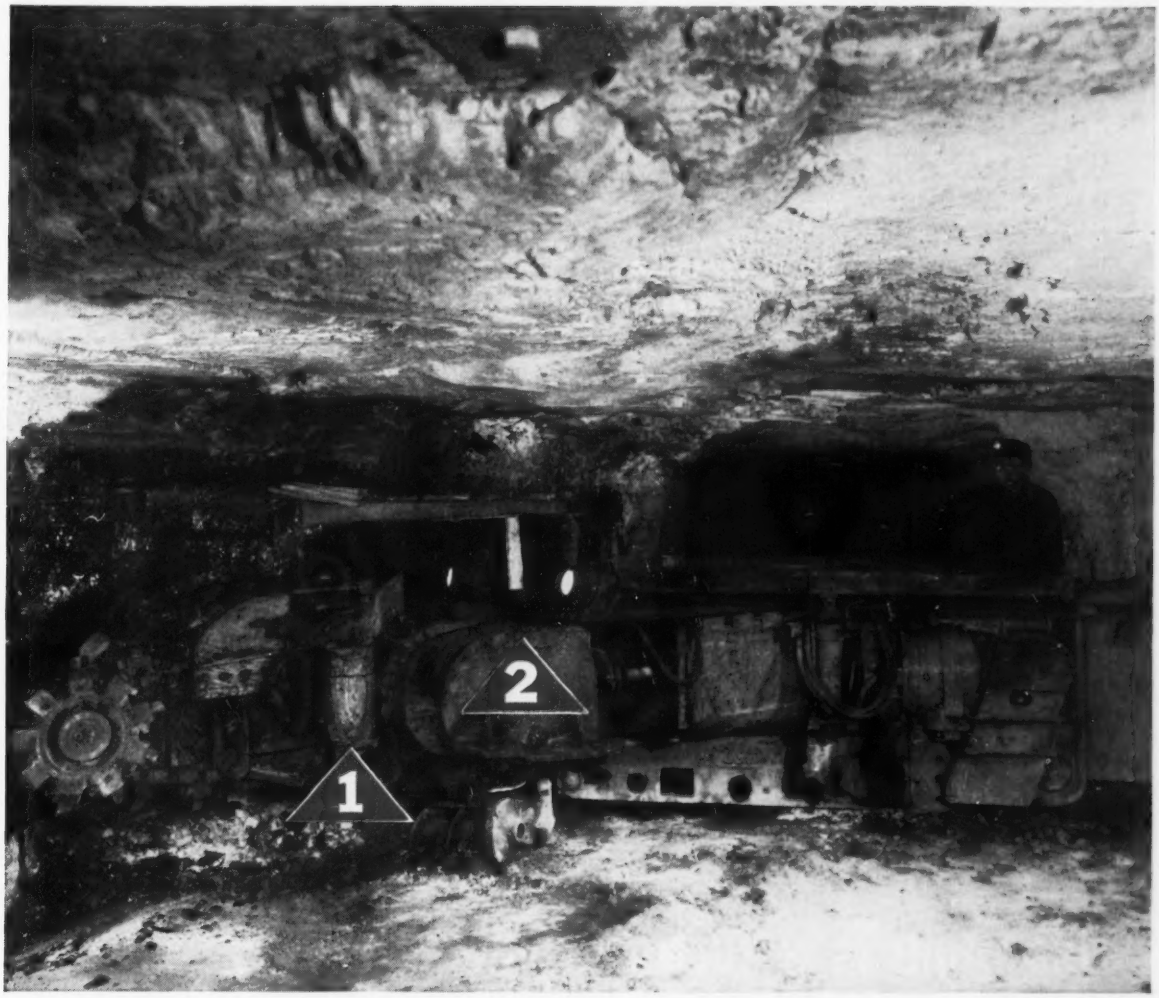
This need for low-unit-cost per yard of output is the basic reason why big-producing, dependable Marion Walkers are favored throughout the coal stripping regions of the earth.

Marion Walkers are built to work continuously in heavy going. They offer the versatility in range and capacity (from 5 to 45 cubic yards—boom lengths to 300 feet) to meet a wide variety of unusual problems from property to property. And, most Marion Walkers are available as diesel or electric-powered units as circumstances demand.

Let a Marion mining specialist project your stripping costs with a Marion Walker on the job. We'll gamble you'll be pleasantly surprised at the low-cost, high-profit ratio.

MARION POWER SHOVEL CO., MARION, OHIO

A Division of Universal Marion Corporation



TWO ESSO PRODUCTS MEET ALL UNDERGROUND LUBE NEEDS

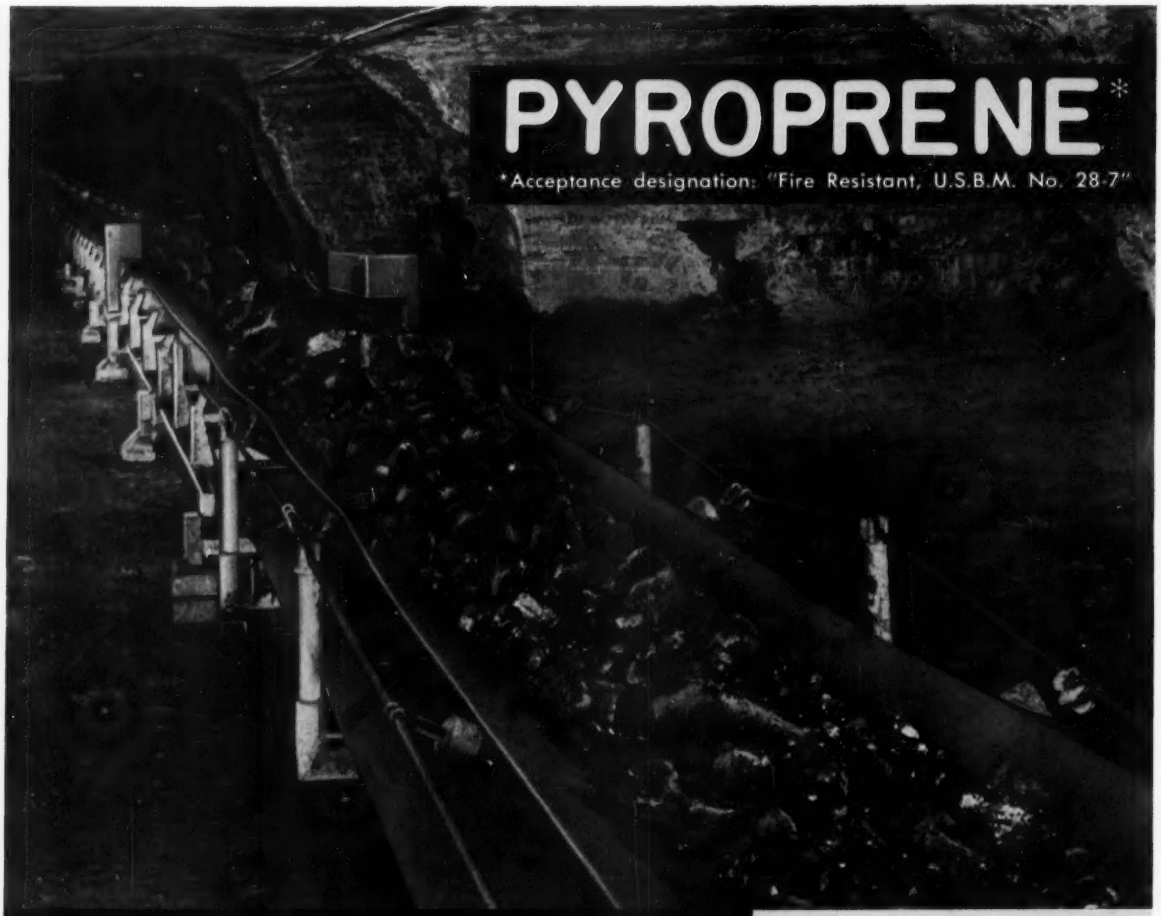
1. NUTO® rust- and oxidation-inhibited hydraulic oil gives extended service. Provides outstanding protection against rust in hydraulic systems used in damp mine conditions. Excellent fluidity for fast start-ups at low temperatures. Maintains good body at high operating temperatures to minimize leakage and pump wear.

2. NEBULA® EP 5F a semi-fluid grease for lubricating gears, bearings, clutches and linkages. Provides extreme-pressure and anti-wear qualities. Inhibits oxidation over long service. Minimizes leakage through seals by virtue of its semi-fluid consistency, unchanged by heat or churning. Nebula EP 1 in convenient cartridge form is recommended for electric motors.

Esso

For more information about time and machine saving Esso lubricants, contact your local Esso office or write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, New York.

In industry after industry..."ESSO RESEARCH works wonders with oil"



PYROPRENE*

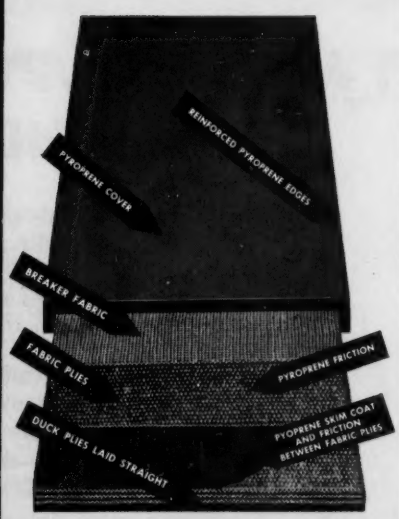
*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-7"

This mine is a torture rack for rubber belting

This belt is *scraped, twisted* and *bent!* It absorbs the day-in-and-day-out *thump* and abrasive *grind* of coal flowing off the loader. It is soaked by water and attacked by damaging corrosive acid. It fights dampness and mildew month after month.

How long can a belt take this punishment? "For years," say Acme-Hamilton engineers, "if it's an Acme-Hamilton PYROPRENE conveyor belt." They should know. They designed and built it to withstand *brutal* punishment! They know it will do its job—because they pre-test every belt *before* it leaves the factory.

PYROPRENE conveyor belts are impervious to fire, oils, acid and mildew. A breaker fabric of tough, cord-locked construction safeguards the belt against *shock* and *impact*. For further information write Acme-Hamilton, Dept. C2.



Acme Hamilton

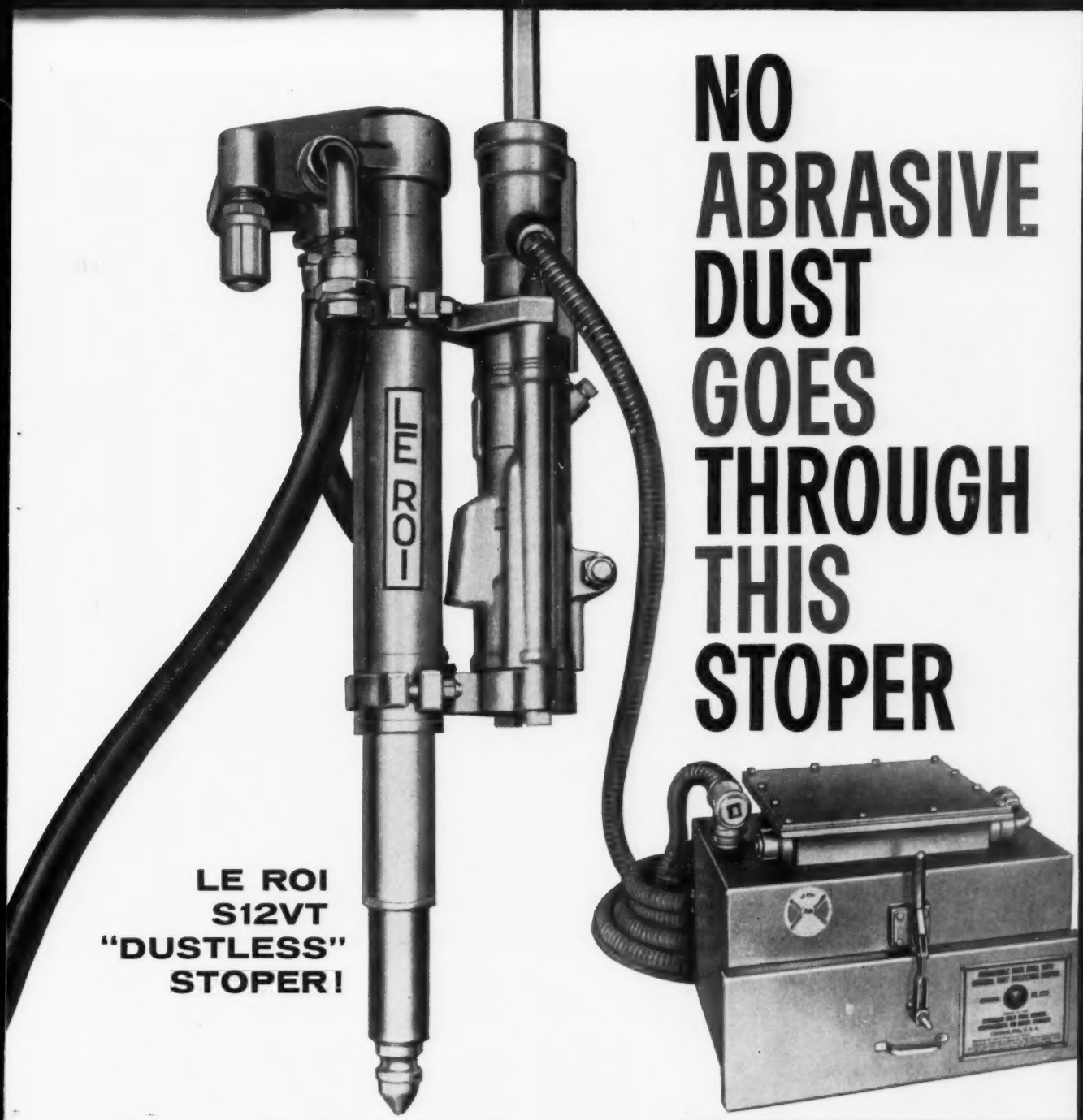
Serving Industry Since 1870

MANUFACTURING CORPORATION, TRENTON 3, N. J.

Divisions: Acme Rubber Mfg. Co. • Hamilton Rubber Mfg. Corp.

ATLANTA • CHICAGO • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES
MILWAUKEE • PITTSBURGH • SALT LAKE CITY • SAN FRANCISCO • SEATTLE

NO ABRASIVE DUST GOES THROUGH THIS STOPER



LE ROI S12VT "DUSTLESS" STOPER!

Abrasive dust will never take this fast, hard-hitting stoper out of action! The exclusive Le Roi dust-collecting system enables you to get miles of trouble-free drilling footage in wet, soft, or hard formations. It protects the tool as well as the operator — lowers dust-count well below wet-drilling standards.

The S12VT draws cuttings through 5-hole CRD or Vac-Nu-Matic® bits. Dust is then passed through the hollow drill steel and out the chuck housing — *not through the stoper* — and into the dust box. The powerful suction keeps hole clean for faster, easier drilling — prevents stuck steels regardless of strata conditions.

This amazing "dustless" drill is light — it's easy to use and move. All controls are on the feed leg for convenient operation and greater operator safety.

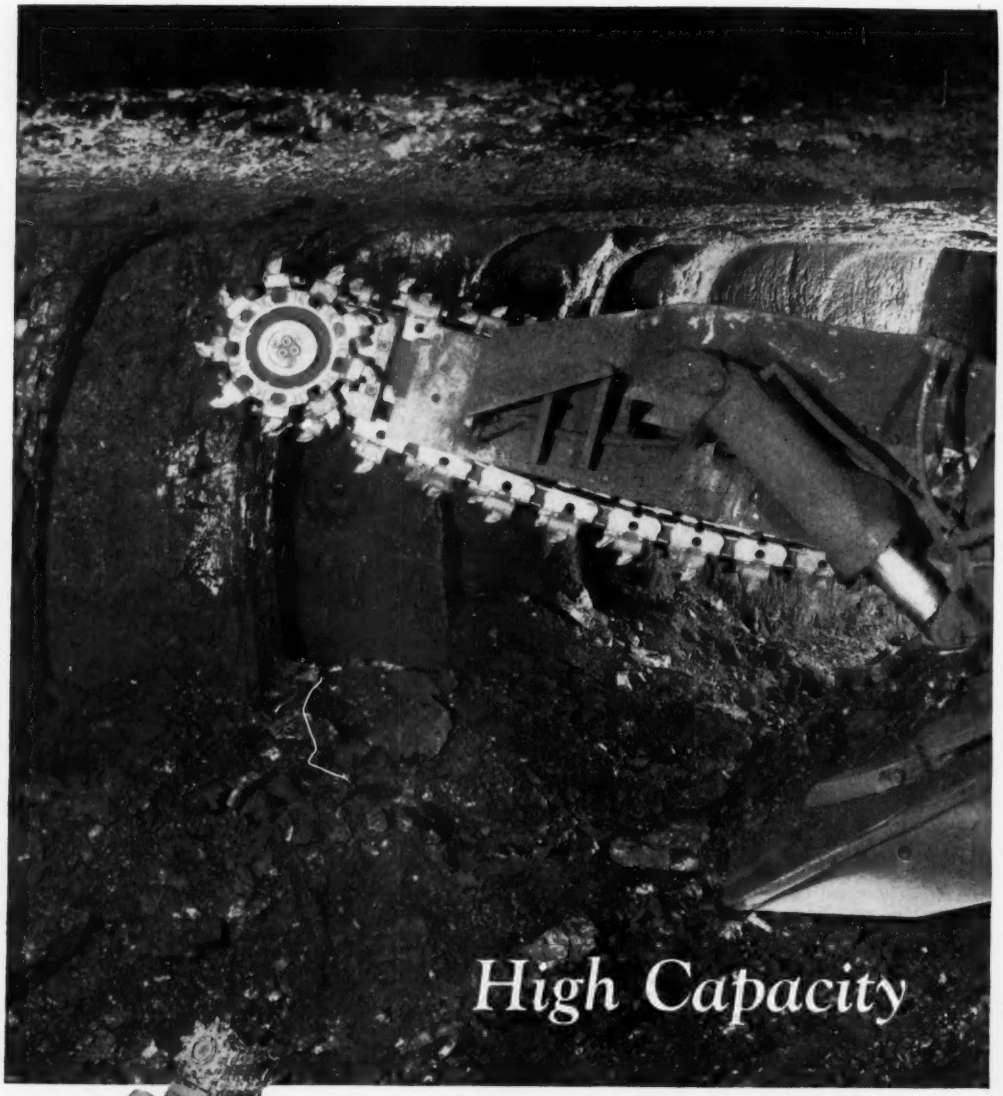
Check all the features of the S12VT — ask your Le Roi distributor about it today! Or write to Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wisconsin.

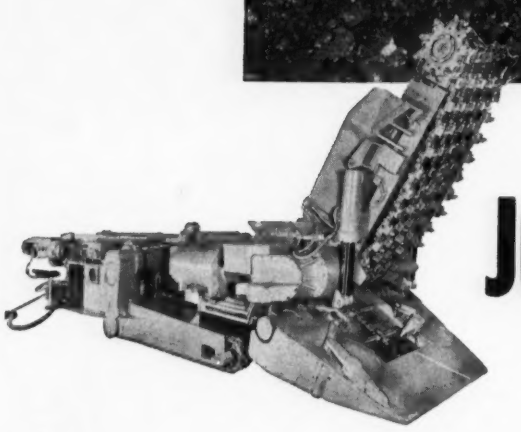
LE ROI NEWMATIC® AIR TOOLS

PORTABLE AND TRACTAIR® AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS

Distributed in the Coal Fields by: Acme Machinery Company, Huntington, West Virginia, and Equipment Service Company, Inc., Birmingham, Alabama.

AT-962





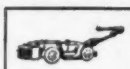
JOY 6-CM

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING MACHINERY

JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

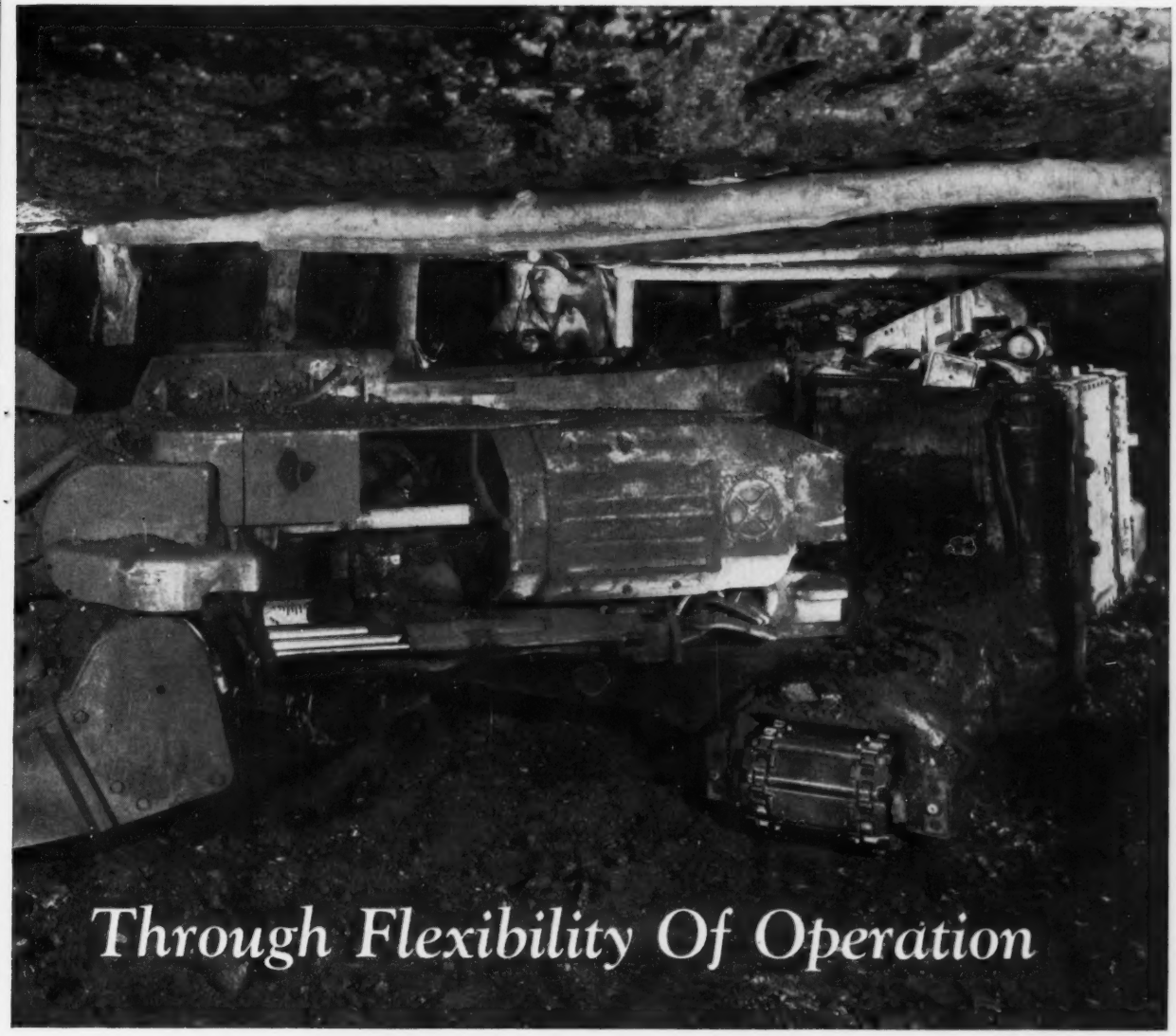

Coal Drills

Coal Loaders

Coal Cutters

Shuttle Cars

Continuous Miners



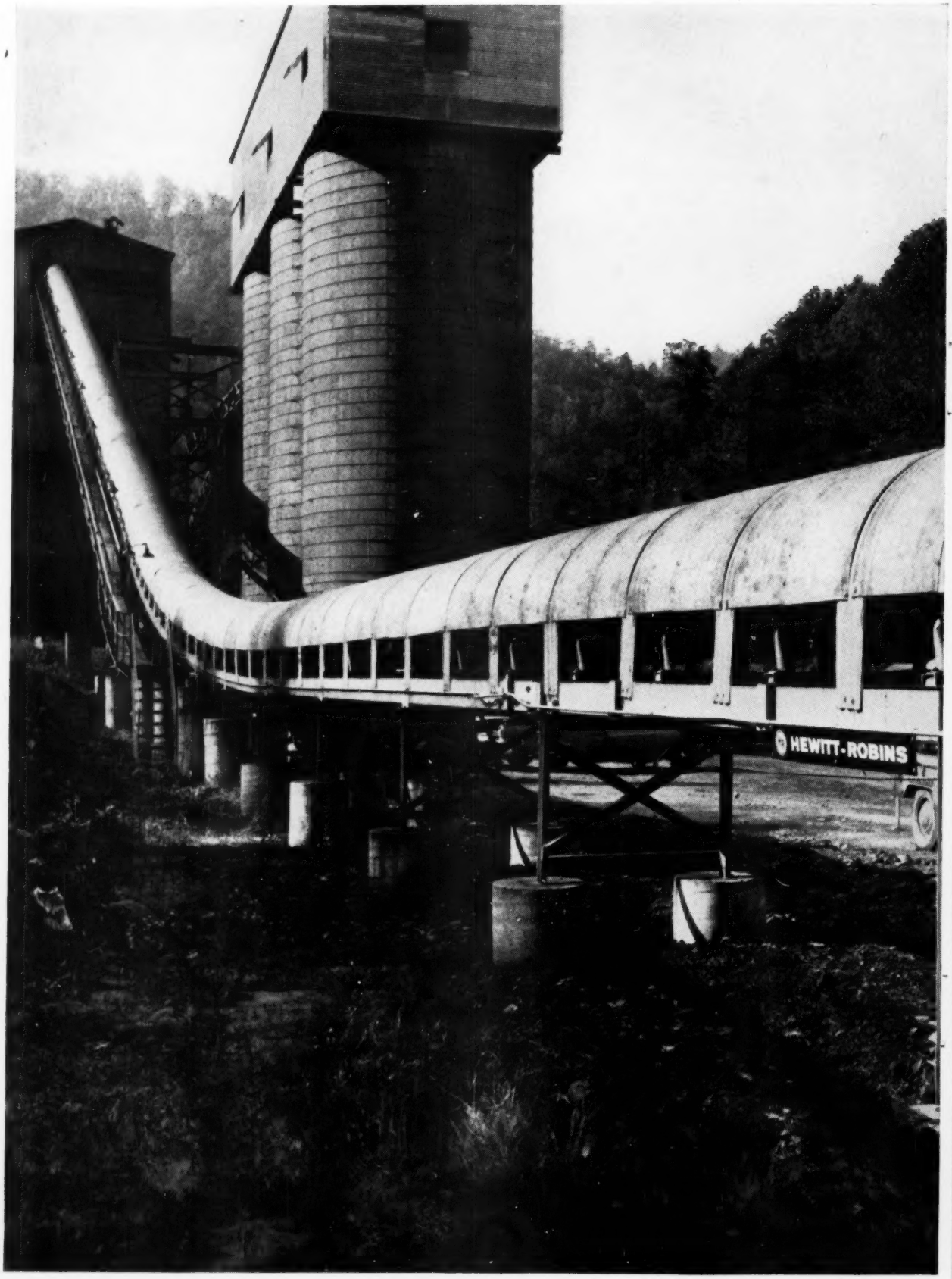
CONTINUOUS MINER

The Joy 6-CM is the most *flexible* high tonnage miner on the market. Rated at 5 to 5½ tons per minute, the 6-CM will mine rooms 12 to 22 ft. wide without adjustment, *or repositioning the machine.* Using a standard 7 ft. ripper bar, the 6-CM can mine any seam from 5½ to 10 ft. high without changing or adjusting parts. It can cut 7 inches below the floor line. That's flexibility. The machine can be furnished with twin roof bolting drills. Because the 6-CM works from a stationary position, mining is not interrupted during bolting.

The 42-inch wide ripper bar sumps 24 inches into the coal, mining more coal with every cut. A fast, gathering arm cleanup, and the wide conveyor are each powered independently of the ripper head . . . the 6-CM can do auxiliary cleanup while the shuttle cars are changing. The coal is stored on the conveyor for immediate unloading.

The 6-CM has two-speed tramming, 85 and 45 feet per minute. Crawler treads 16 in. wide make it sure-footed, even on grades and soft bottom.

The mining speed and flexibility makes the 6-CM a top performer in seams of 66" and higher. Rugged construction, with extra strength where experience has shown that it is needed, keeps maintenance and downtime at a minimum. Talk to your Joy engineer about it. He has complete data.


HEWITT-ROBINS

How to move 194 pounds of rock and coal per second

Hewitt-Robins conveyor belting of high-tenacity Enka rayon gives a graphic demonstration of its superior performance

Here in Whitewood, Virginia, the Jewell Smokeless Coal Company moves 350 tons of rock and coal every hour. To keep operations at peak efficiency, they employ a Hewitt-Robins sectional conveyor and Hewitt-Robins belting.

The 462 foot section of the conveyor, shown here, carries rock and coal into the preparation plant. This Hewitt-Robins belt is Ajax 36″ C/R (cotton/high-tenacity Enka rayon) construction.

Once again, Hewitt-Robins conveyor belting of high-tenacity Enka rayon yarn and cotton demonstrates its superior performance and smooth-running efficiency. Here is another reason why, year after year, Hewitt-Robins continues to specify Enka rayon. Hewitt-Robins and other quality manufacturers know that high-tenacity, low-cost Enka rayon is made stronger to last longer.

Pound for pound, Enka high-tenacity rayon is your best value in industrial yarn.

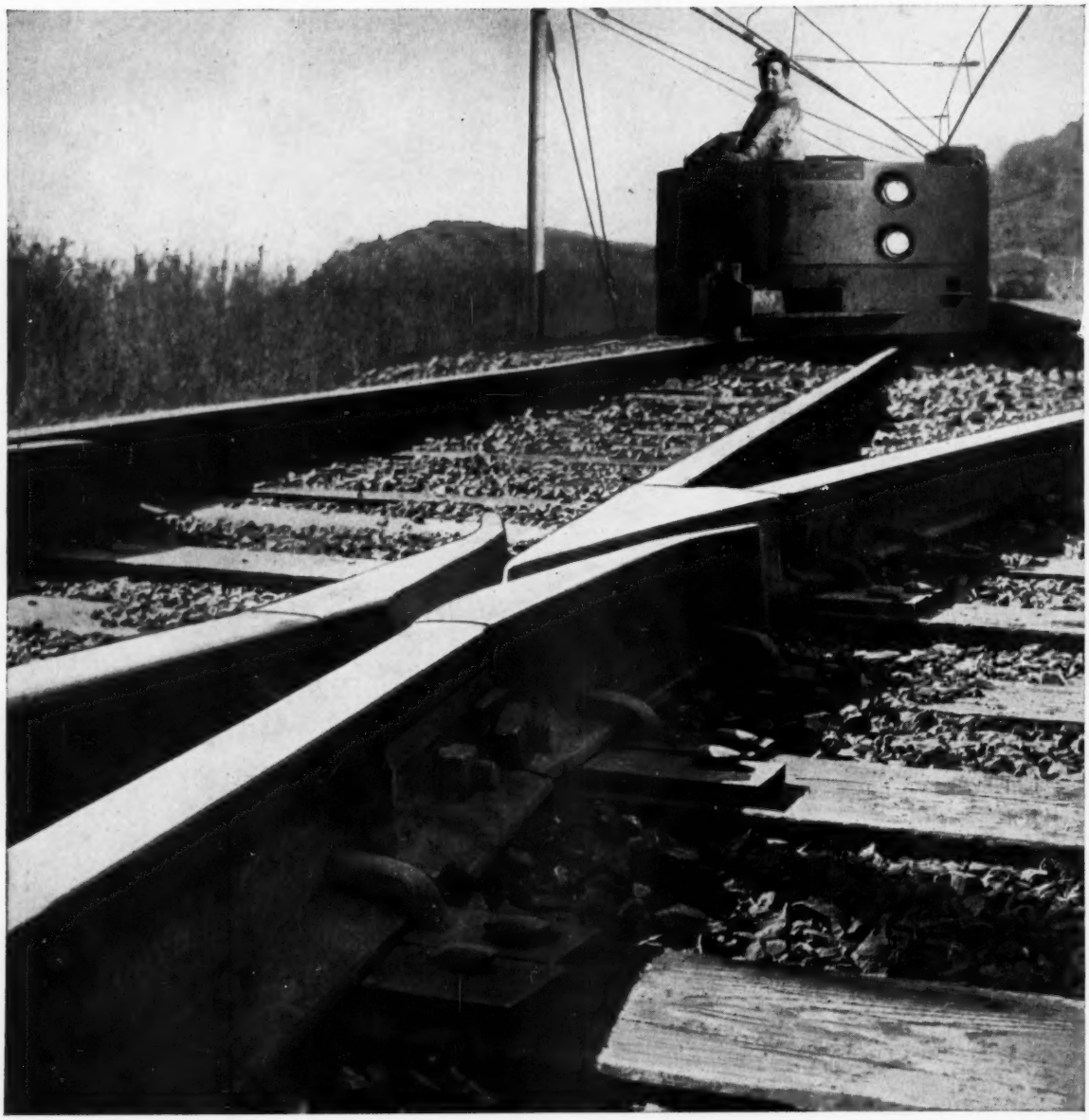
Greater strength • More elasticity • Increased heat and humidity resistance • Higher safety factor • More economy • Superior flexibility • Better shock absorbency • Longer service • Less maintenance.

Specify Enka high-tenacity rayon yarns for industrial rubber products, chafer fabrics for truck and passenger tires, heavy-duty sewing thread for multi-wall bag closing and many other vital end-use applications.

Write for Hewitt-Robins brochure on C/R conveyor belting of high-tenacity rayon and cotton. It gives technical data on strength and other characteristics of belting made with cotton-rayon fabric. Write Hewitt-Robins, Stamford, Conn. Ask for bulletin 3-42.

ENKA high-tenacity rayon for industry

American Enka Corporation, 530 Fifth Avenue, New York 36, N. Y.
Leading producer of yarns and fibers for apparel, home and industry and Tyrex® viscose tire yarn.



How to keep a frog from jumping

Those husky hooks gripping the rail and frog bases are integral parts of Bethlehem Hook-Twin Frog Plates. They do more to keep a frog in place than regular track spikes ever could.

First of all, they're bigger and stronger than spike heads. Secondly, being part of the plate itself, each hook distributes the track motion over a broad area of the tie. This removes direct pull from the spikes which anchor the plate, and checks both vertical and lateral thrust.

Because they are used in pairs, Bethlehem Hook-Twin Frog Plates fit any frog position or angle, making it unnecessary for you to inventory a large variety of plates. A few standard lengths should suffice for most locations. In addition, they elevate the frog to keep it level with the running rail. Let a Bethlehem engineer go over the full story of Hook-Twin Frog Plates with you, to see how they might improve your haulage and cut down maintenance. Just call our nearest office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

"We tried several big haulers... and the 65 Payhauler® tops 'em all!"

—New Hope Crushed Stone & Lime Co., New Hope, Pa.

New Hope's "65's" speed full 19-ton loads of dolomite from quarry to 300-ton-per-hr. capacity crusher—with a maximum climb-out grade of 16% and an 800-ft. haul! The 250-hp "65" travels up to 36 mph.; the 375-hp "95" up to 38 mph.!

"Before buying two International® 65 Payhauler trucks, we had demonstrations by several large haulers," reports Edgar N. Putnam, for New Hope Crushed Stone & Lime Co.

"The '65' topped them all for production, ease of operation, and all-around efficiency. Main '65' features are ample power, balance for full-load delivery, and genuine operating ease and safety."

Both the 19-ton 65, and 27-ton 95 Payhauler trucks have the strength-multiplying International corrugated body design—that sheds weight, increases capacity. The direct-start International "817" engine super-powers both "65" and "95"—to outspeed former models, up to 40%. And both "65" and "95" highball full loads safely with reserve-area braking and new course-holding power-steering!

Compare—prove on the job that Payhauler gives you top off-road capacity; top power-to-weight ratio; top profit-earning ability! Let your International Construction Equipment Distributor demonstrate!

Get 11-second Payhauler dumping with exclusive inverted hoist body-positioning. Positive up-and-down snubbing control prevents machine-mauling dumping impact!

International®
Construction Equipment

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Illinois
A COMPLETE POWER PACKAGE

How granite-bucking TD-20 wins tough quarry job!

—for Superior Stone Company, Crabtree Creek Quarry, Raleigh, North Carolina

Main reason why it's a TD-20 instead of some competitive rig: the more powerful, stronger-built "20" replaces a past model International TD-18—that set a stand-out record of high availability and low upkeep at this quarry!

The "20" is key equipment in helping feed the 200-ton-per-hour capacity crushing plant at Crabtree Creek Quarry of Superior Stone Company (Division of American Marietta Company).

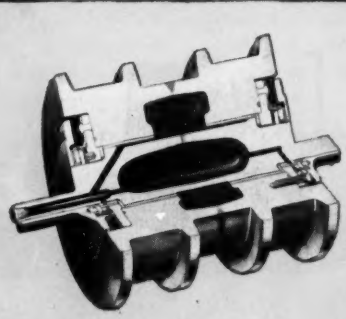
Slamming hard, heavy granite stone around is a main item on this International TD-20's work diet. That and tough over-burden removal, and haul-road maintenance!

"Rock-Bossing" power and strength

The TD-20's engine is a high-torque 134-hp diesel—with 6-cylinder smoothness and International diesel starting ease and economy. Bridge-strong track frames of heavy-duty, gusset-braced, welded box sections form the TD-20's rock-shock-resistant undercarriage.

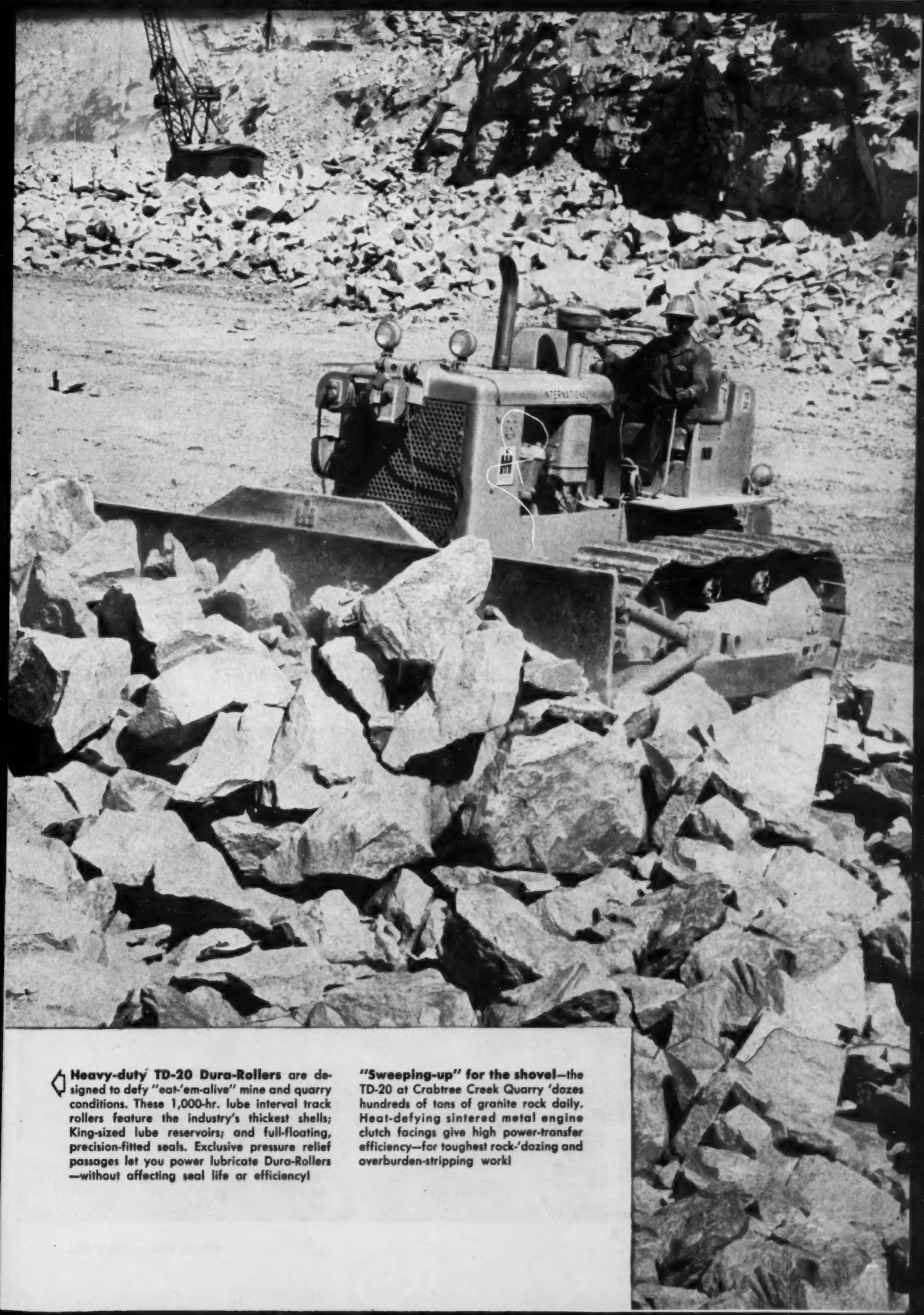
Exclusive International 3-point-mounting allows free track oscillation for rough mine and quarry duty—and maintains positive, life-prolonging alignment. TD-20 weight rides smoothly on thick-shelled Dura-Rollers—the dual-protected track rollers that make, 1,000-hr. lube intervals practical!

Compare TD-20 performance to anything else on tracks—for capacity, economy, and long life. Measure production-boosting features like "single-stick" shift, 6-speed full-reverse transmission; and cycle-speeding Shuttle-Bar control. See your International Construction Equipment Distributor for a demonstration.



International® Construction Equipment

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Illinois
A COMPLETE POWER PACKAGE



Heavy-duty TD-20 Dura-Rollers are designed to defy "eat-'em-alive" mine and quarry conditions. These 1,000-hr. lube interval track rollers feature the industry's thickest shells; King-sized lube reservoirs; and full-floating, precision-fitted seals. Exclusive pressure relief passages let you power lubricate Dura-Rollers —without affecting seal life or efficiency!

"Sweeping-up" for the shovel—the TD-20 at Crabtree Creek Quarry 'dozes hundreds of tons of granite rock daily. Heat-defying sintered metal engine clutch facings give high power-transfer efficiency—for toughest rock-'dozing and overburden-stripping work!

ALUMINUM DUMP BODIES WEIGH 50% LESS...

Haul Up to 3,500 Lb of Extra Payload for Added Profit

Durable Alcoa Alloys Defy Denting to Save Maintenance Dollars

Dent Resistant

Modern Alcoa Aluminum alloys, advanced design and new fabricating techniques combine to give today's aluminum dump bodies far greater dent and impact resistance than standard steel construction. They withstand years of hard knocks and grueling service. Service records prove aluminum assures longer unit life with less maintenance.

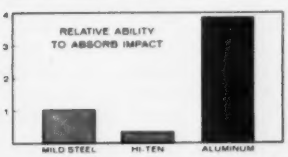
Light Weight

When you trim a pound of dead weight from a rig, you take on an extra pound of payload worth a dollar per year in extra revenue. Producing earnings as much as 16 per cent above average, lightweight dump bodies of Alcoa® Aluminum can pay for themselves in less than a year of operation. From then on, it's *all extra profit* for the operator.

Corrosion Resistant

Aluminum's corrosion resistance helps hold down repair costs to boost earnings even further. Needing no protective coating of paint, aluminum alloys stand up under the corrosive and abrasive attack of many commonly hauled bulk materials. Chemicals, salt, high-sulfur coal, fertilizers, lime and sand can't inflict damage, so aluminum dump bodies stay new-looking far longer than steel, wash clean in half the time—and dump clean every time.

A dump body folder, which tells how many operators have increased profits by switching to aluminum, is yours for the asking. Write to Aluminum Company of America, 1776-C Alcoa Bldg., Pittsburgh 19, Pa.



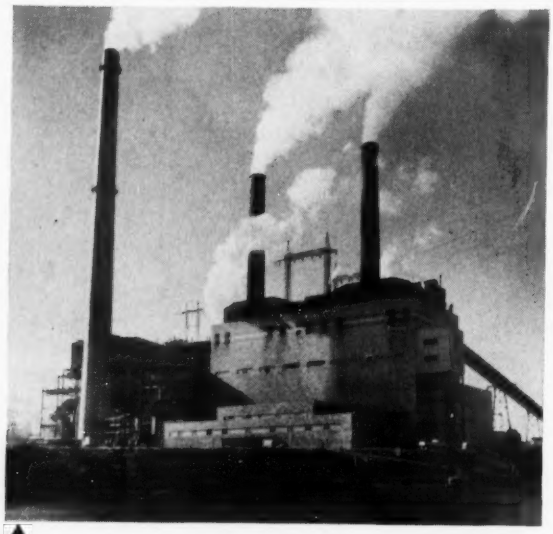
PROOF: Aluminum Is Tougher
Tougher than steel! Dump bodies built of Alcoa Aluminum alloy can take *three* times as much impact as steel, at *half* the weight.

Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM

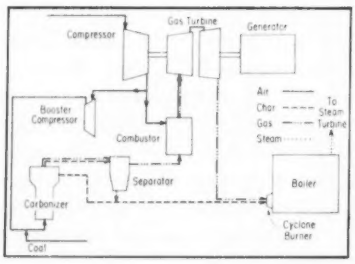
For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and the Emmy Award winning "Alcoa Theatre" alternate Mondays, NBC-TV

News Roundup



At this Ohio Power Co. Muskingum River plant . . .

A 5-Mw Gas Turbine Will Burn Coal Gas . . .



◀ In this system

WITH THIS combined cycle, first of its kind according to *Electrical World*, a McGraw-Hill publication, the new turbine will produce 5,000 kw plus combustible byproducts for the steam boiler. As a result it will reduce the amount of coal needed by the boiler to generate steam for the 215,000-kw steam turbine.

A PROTOTYPE gas turbine, burning coal gas, will be placed in operation in spring of 1961 at the Muskingum River plant of Ohio Power Co. The unit, which will generate 5,000 kw of electric power and provide combustible byproducts for the existing steam boiler, is to be part of a combined cycle with one of the plant's four 215,000-kw steam turbines—the first time a steam turbine and a gas turbine will be used in a combined cycle by a coal-burning electric power plant.

What does this "first" mean to coal? Chiefly, that if the experimental operation proves successful in a technical and economic way, more coal-gas turbine-steam turbine combinations, in which the gas-turbine capacity will be a larger part of the total process, will be forthcoming. In fact, according to the announcement, it is not unlikely that much bigger gas turbines than any designed and built to date might be used.

The decision to proceed with the installation was announced jointly by Philip Sporn, president of American Electric Power Co. and Ohio Power, its subsidiary operating company, and by William S. Ginn, vice president and general manager, Turbine Div., General Electric Co. The latter firm is supplying the turbine and related control devices.

Seeking Efficiency—AEP wants added generating efficiency. It expects an improvement of 4% over-all efficiency in full-scale applications of the cycle. Previously, the use of gas turbines in power production has been limited, and they have burned only natural gas, distillate and Bunker C oils. Using coal gas, the new turbine will not only generate an additional block of 5,000 kw of electric power, but will supply combustible byproducts to the steam boiler. The result is a reduction in the amount of coal required by the boiler to feed the 215,000-kw steam turbine.

Process Details—In the system, coal for the gas turbine, broken down by high temperature in a carbonizer, yields both gas and char. The gas is burned in the turbine. Then the hot exhaust from the turbine joins the char in a cyclone-type burner, firing into the pulverized coal-fired boiler. The char burns and supplies a portion of the steam generated for the steam turbine.

The gas turbine is to be housed in an annex at one end of the Muskingum River plant. It will be coupled with Unit No. 1 which went into operation in 1953. This unit, plus three similar units, give the plant total generating capacity of 880,000 kw, making it the largest in the AEP seven-state system.

Research Stressed—In the announcement, Mr. Sporn and Mr. Ginn stressed that this project is another step in a long series of cooperative developments by GE and AEP going back more than 40 yr and having as its aim the advancement of the technology and economics of large-scale power generation. In the course of this series, they noted, a great deal of production work has been carried out in development of larger generating units, higher speeds, higher steam temperatures, reheat and double reheat of steam, and, most recently, ultra-high steam pressures.

(*Continued on p 28*)

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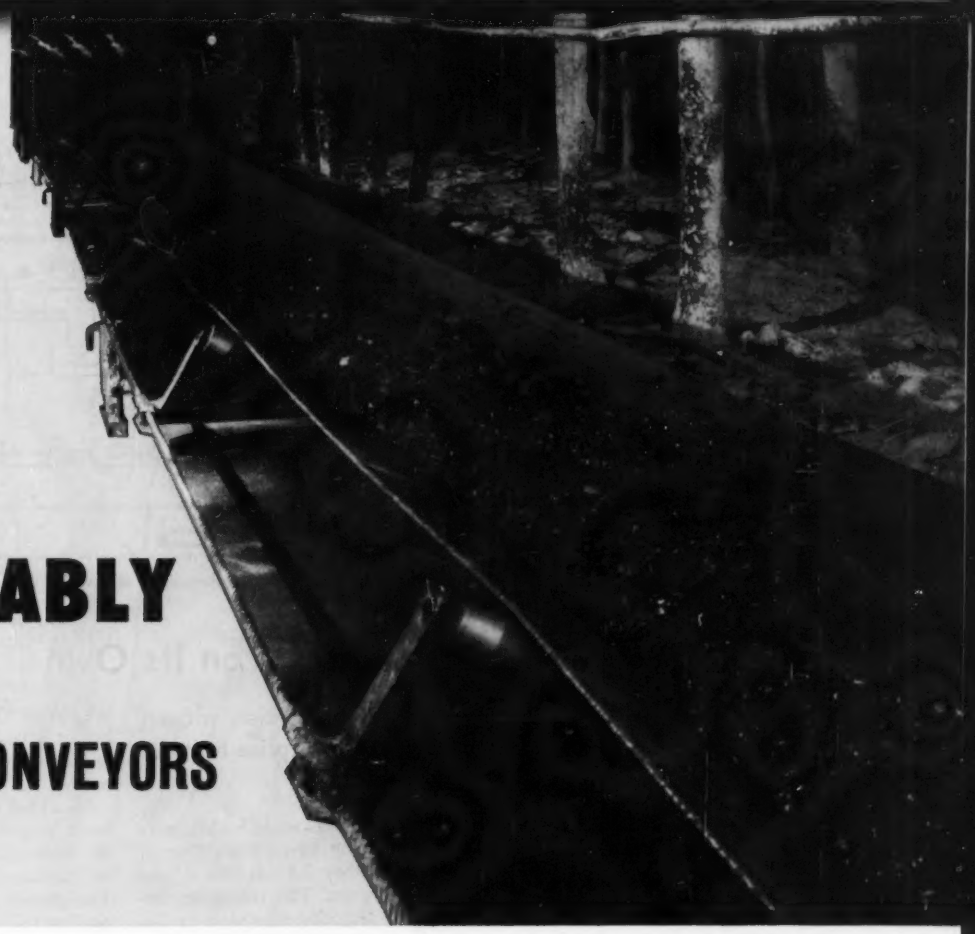
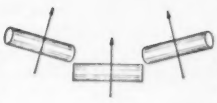
You too can MOVE COAL MORE PROFITABLY WITH LONG LO-ROPE CONVEYORS



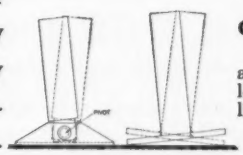
If you asked only a few of hundreds of mine superintendents why they specified Long Lo-Rope Conveyors you'd probably get a number of different answers. Some of them would say they solved safety problems, others that they eliminated spillage and time consuming realignment of conveyors by replacing out-dated systems. Chances are, you too will move coal more profitably with Long Lo-Rope Conveyors.

If you're considering new conveyor equipment, check the four special advantages of the Long Lo-Rope Conveyor illustrated (right). There are many more advantages, but these four will give you an idea how so many mine operators are saving time, money and material with Long Lo-Rope Belt Conveyors.



BELTS STAY CENTERED

Self-aligning idlers are top mounted on ropes allowing belt motion to tip idlers in direction of travel. Inward lines of thrust tend to help keep belt and loads centered.

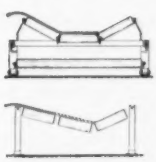


CONVEYOR STAYS ALIGNED

"Rocker" support stands move back and forth to compensate for uneven loads . . . can't "walk" out of position like one piece stands.

GREATER CAPACITY . . . LESS SPILLAGE

Long Lo-Rope 27° fixed on troughing angle centers loads better and increases belt capacity. Also, the greater "cup" of belting eliminates the chance of belt spilling by flattening between idlers.



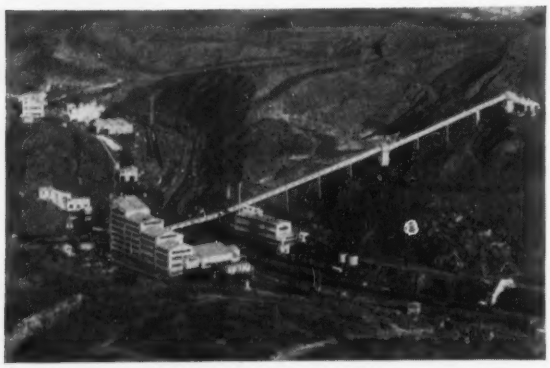
SAFER . . . SAVES BELTS

Ropes are completely out of the way making it far safer to handle man and supplies. And, even with severe misalignment, the belt can't be cut to ribbons by hanger stands.

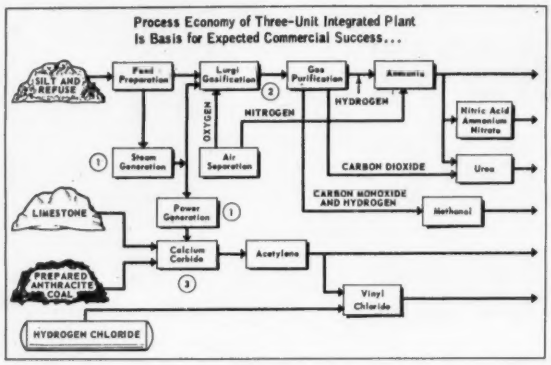
For complete details, write: The Long Company, Oak Hill, West Virginia.

The **LONG** OAK HILL, W. VA. *Company*

LONG . . . THE MOST EXPERIENCED, SINGLE SOURCE FOR CONVEYOR MINING SYSTEMS



P&R PLANS to use these mountains of anthracite silt . . .



to make chemicals and steam for electric power in this way.

Philadelphia & Reading Will Go It on Its Own

Large Pennsylvania anthracite producer will establish, without the cooperation of General Dynamics Corp., an enterprise to make chemicals from coal wastes.

GENERAL DYNAMICS CORP. is not going ahead with its joint program with Philadelphia & Reading Corp. to develop chemical products from coal wastes.

But Philadelphia & Reading reported it would proceed on its own at once to establish a chemical enterprise "that will make use of the immense anthracite wastes around Pottsville, Pa."

Howard A. Newman, P&R president, said the decision was made by his firm's directors following advice from General Dynamics that they did not want to continue the program. The companies announced last May that they were exploring the possibility of setting up a jointly-owned company for the enterprise.

Mr. Newman said that "for some time we have considered the possibility of sponsoring this important chemical enterprise alone. Our board has authorized the letting of contracts for plant construction and for employment of management personnel . . ."

He added that his company's plans are based on a number of independent studies showing that the processes involved are technically feasible and profitable. The process which would be used, according to previous announcements, is a Lurgi-type gasification and purification system to make hydrogen and synthesis gas for producing ammonia, nitric acid, ammonium nitrate, urea, methanol and other chemical building blocks.

Builds New Plant

Eastern Gas & Fuel Associates will build a new coal preparation plant at its Federal No. 1 mine at Grant Town, W. Va. The new facility will process northern West Virginia coal, much of which is used for steam generation in utility plants.

Designed by Eastern's engineering department, the facility will include the most modern coal-treatment methods available and will enable the firm to maintain a constant supply of high-quality fuel needed for utility and other uses, stated company officials.

Equipment will include heavy-media washer for preparing coarse coal, and Deister table and froth flotation sections to clean fine coal. The plant will be able to process 12,500 tpd, said the report.

The new construction represents the final stage in a major improvement and expansion program at the Federal mine. A new shaft, skip hoist and auxiliary facilities, including 8,000 ft of underground mine track, were completed in 1958. Last year about 600 large mine cars were acquired.

Eastern operates mines in northern and southern West Virginia and central Pennsylvania. The Federal facility is the newest in a series of modern cleaning plants installed at company mines. Ground breaking for the plant is scheduled for this fall, with completion in the latter part of 1961. Mining operations will continue normally during the construction period.

Study Freight Rates

The National Coal Association has pledged cooperation if Governor Nelson A. Rockefeller of New York follows the recommendation of his Committee on Power Resources for "deeper exploration" of railroad freight rates on coal.

NCA president, Stephen F. Dunn, said the coal industry concurs in committee findings that lower freight rates on coal would benefit electric power consumers and "quite possibly could offer a long-run advantage for the railroads."

He pointed out that the coal industry works closely with rails, whose revenue for carrying coal amounted to more than a billion dollars in 1959, in an attempt to solve rate problems "to the satisfaction of all concerned and in the interest of the general economy."

Commending the governor's committee for concluding that coal is the source of energy "upon which we must depend" for the foreseeable future, Mr. Dunn explained that mineable bituminous coal reserves in the United States amount to 947 billion tons—more than 30 times as much as has been produced in two centuries.

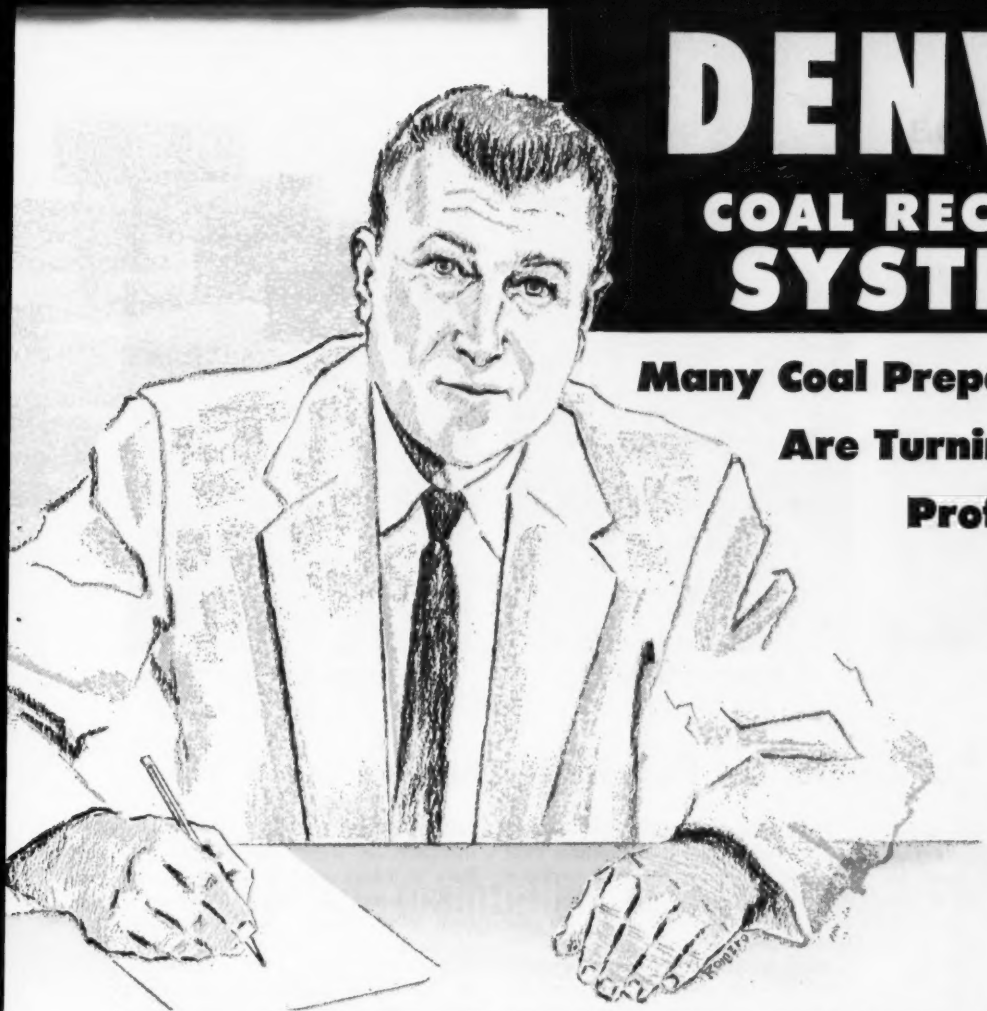
"With an unprecedented upward thrust in demand for heat and power looming ahead, government and industry must make every effort to guarantee that supply will not fall short of requirements," he said.

Push For Coal

The bituminous coal industry, backed by growing evidence of coal's price and availability advantages over competing fuels, has announced an intensified program aimed at moving into more fac-

(*Continued on p 52*)

DENVER
COAL RECOVERY SYSTEMS



Many Coal Preparation Plants Are Turning Waste Into Profits and at the same time . . .

(1) Recover marketable fines from waste water

(2) Remove solids from washery waste and simplify disposal

(3) Reclaim water in a closed water system

Compare This Example To Your Own Coal Preparation Plant:

(A) 1,000 G.P.M. WASHERY WATER IS SENT TO WASTE.

(B) WASTE WATER CONTAINS 10% SOLIDS AT 20% ASH.

(C) SOLIDS REPRESENT 26 TONS PER HOUR AND CONTAINS 84% COAL THAT RUNS 5% ASH.

All washery solids (−28 mesh x 0) are sent to a simple Denver Coal Recovery System which, for this capacity, costs about $86,000 to $90,000, plus approximately $64,000 to $100,000 for installation. (Estimated total approximately $150,000 to $200,000.)

Ash in solids, reduced by Denver "Sub-A" Coal Flotation from 20% to 5%, is blended with coarse coal.

Efficiency of system is approximately 92% and produces some 20 tons per hour of 5% ash coal.

Solids in refuse effluent are dewatered to approximately 40% moisture and conveyed to waste.

Clear water overflow is recycled to plant. Efficiency of closed water system requires only approximately 42 g.p.m. make-up water to replace water lost in clean coal and dewatered refuse.

Total coal fines recovered: 20 tons per hour (280 tons per 14 hr. day) @ $5.00 per ton yields $7000 per 5 day week or $350,000.00 per year.

Operating personnel, overhead and maintenance are low.

The increased coal recovery from the fines should pay for this equipment and installation in less than six months and will accomplish these objectives:

(1) Recover Clean Coal Fines
(2) Remove solids from washery wastes and simplify disposal
(3) Reclaim water and close plant water system.

DENVER Equipment Company can supply you a complete, centralized service on Coal Recovery Systems. Estimates and projections based on reliable laboratory test information are available without cost to you. We invite you to use our experience in the fine coal recovery field. Write today!

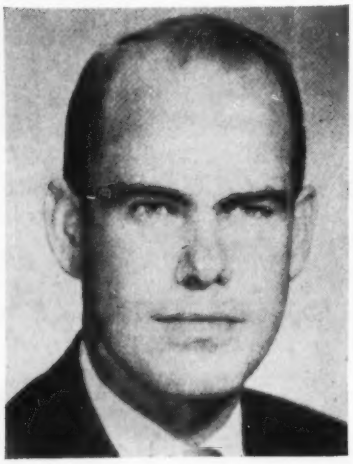
"The firm that makes its friends happier, healthier and wealthier"

STANDARD RELIABLE 24 HOUR SERVICE EFFICIENT

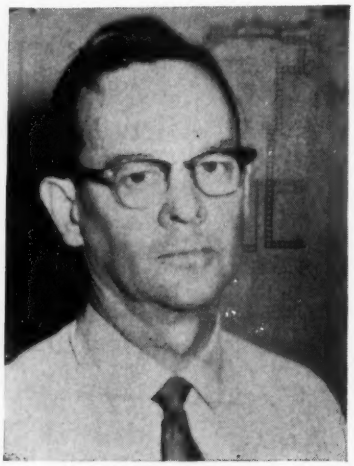
DENVER EQUIPMENT COMPANY

DENVER 17, COLORADO Phone CHerry 4-4466 1400 SEVENTEENTH ST.

People in Coal



Harry Williamson Jr.



Thomas L. Garwood

Charles E. Sanford

Freeman Coal Co. Announces Personnel Changes

Harry Williamson Jr. has been named superintendent of mines at Freeman Coal Co. Until accepting the new position, he was superintendent of the Williams mine of Mountaineer Coal Co. He comes from southern Illinois, is married and has a son and daughter. Holding a BS degree in Electrical Engineering from the University of Illinois, Mr. Williamson worked for the Union Colliery Co. after graduating from college. Afterwards, he served 2 yr in Turkey with the Hamilton Overseas Construction Co., later accepting a position at Mountaineer Coal Co.

Thomas L. Garwood, former assistant to the vice president at Freeman Coal Co., was promoted to chief engineer. Born at Coal Bluff, Ind., he first worked in family-owned coal mines in the Terre Haute area. He received a BS degree in Mining Engineering from Kentucky University and was employed by CW&F Coal Co. at Orient No. 2 as an engineer. Most of his years were spent as a preparation plant engineer where he helped develop equipment for preparation of stoker coal. He is a member of AIME, IMI and the Coal Committee of Illinois Geological Survey.

Charles E. Sanford is a new industrial engineer with Freeman Coal Co. Born in Charleston, W. Va., he holds a BS degree in Mining Engineering from West Virginia University, School of Mines, and was first employed in the Warner Collieries Co., Mammoth, W. Va. There gained experience as a rodman, transitman and assistant office engineer. Later he became assistant to the superintendent and then superintendent at Coal Standards, Inc. He started work with Freeman Oct. 18, 1959. He is married and father of two girls.

F. F. Estes, director of the Transportation Dept. of the National Coal Association, has retired after 41 yr of service with the association. Mr. Estes, who was born in Paris, Ky., began as stenographer with NCA in 1919. He was named assistant traffic manager in 1926 and traffic manager in 1935. When the Transportation Dept. was created in 1954, he was chosen as director. Admitted to practice before the Interstate Commerce Commission in 1930, he has participated in numerous rate and revenue proceedings before the ICC. In addition to his other duties with NCA, Mr. Estes served as executive secretary of the Coal Exporters Association of the United States, Inc. The functions of the Transportation Dept. will be combined with those of the present economics and statistics office into a new economics and transportation division, to be headed by **Dr. Myles E. Robinson,** now head of economics.

Henry Callis, Madisonville, Ky., has been appointed director of the Strip Mining & Reclamation Div. of the Kentucky Dept. of Conservation. Mr. Callis has been identified with strip mining since 1946. He was superintendent of the Ruby Mining Co. until June, 1958, when an injury forced him into semi-retirement. He succeeds **Paul Gannon of** Madisonville, who resigned.

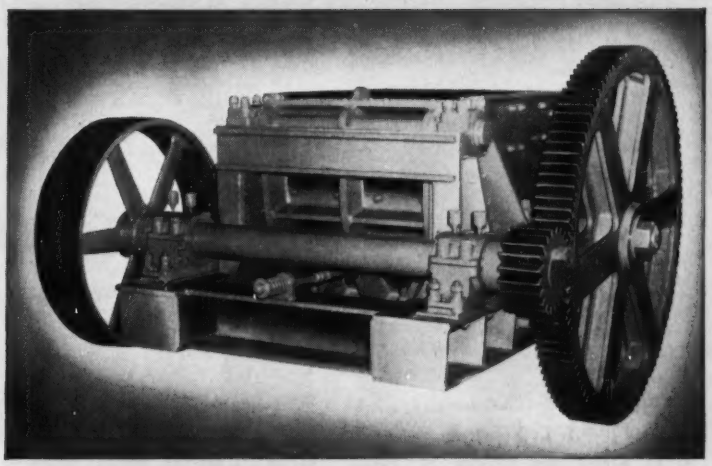
Harry R. Reese, from Kingston, Pa., has been appointed a state mine inspector for Pennsylvania. Mr. Reese has been associated with the Hudson Coal Co. for many years and is known in the Kingston area for his work with the Boy Scout group.

Automatic Solid Fuels, Inc., has changed its name to Bituminous Coal Equipment, Inc., and elected the following officers: **C. R. Mabley Jr.,** president, Island Creek Coal Sales Co.—president; **W. W. Bayfield,** vice president, marketing, NCA—executive vice president; **Walter K. Scherer**—vice president and treasurer; **R. J. Johanson,** executive vice president, American Retail Coal Association—secretary and assistant treasurer; and **Frank Kirkpatric,** managing director.

Dr. A. A. Potter, president, and **Dr. H. J. Rose,** vice president and consultant, will retire from Bituminous Coal Research, Inc., June 30. **Stephen F. Dunn,** president of the National Coal Association, has been elected to fill a vacancy on the BCR board.

Obituaries

William H. Sweet, 89, died Jan. 30. He was well known in the western coal industry and had served as secretary-treasurer of Standard Coal Co. and Su-



PENNSYLVANIA HERCULES

New job-proved single roll crusher brings you lower operating, maintenance costs

Pennsylvania has researched the factors that make single roll crushing costs mount—and come up with a new machine specifically designed, and *job-proved*, to keep costs down.

Cast alloy steel roll shell is made in one piece and keyed as well as shrunk on the rollshaft. No segments or renewable teeth to loosen or fall out. Readily accessible teeth are easily built up by welding.

Here are just a few high spots of this great new crusher:

- Hopper jams are prevented by the larger hopper opening and spacious throat opening made possible by the contour of the breaker plate.

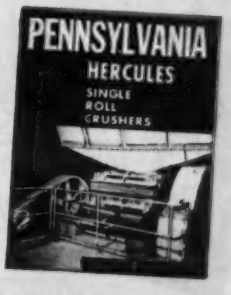
New automatic toggle release supplies positive release mechanism for breaker plate.

New design of countershaft placement, plus large diameter of the gear improve stress distribution on countershaft bearings.

Hercules bearings are away from the frame. Easy to get at, easy to maintain.

Breaker plate is heavy steel fabrication lined with cast manganese steel wearing plates; guaranteed against cracks and flaws.

If you have a job where a single roll might be used, find out more how this new Pennsylvania Hercules will save you money in more ways than one. Send for new Bulletin 2020.



PENNSYLVANIA CRUSHER DIVISION
BATH IRON WORKS CORPORATION
WEST CHESTER, PENNA.

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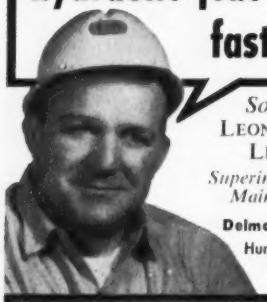
Over 50 years concentrated experience in all types of material reduction makes Pennsylvania your best source of crushers and engineering advice and service. Call on Pennsylvania with your next crushing problem. Representatives from coast-to-coast.

PENNSYLVANIA CRUSHERS

BATH-BUILT

"Our Schroeder Portable Circuit Tester solves tough hydraulic jobs fast!!!"



So Says
LEONARD W. LEEDY,
Superintendent of Maintenance
Delmont Fuel Co.
Hunkers, Pa.

And coal mine maintenance men know and prove to their companies that this instrument saves DOLLARS cuts DOWN TIME

when hydraulic troubles try to beat down tons per man!!!

•

keep your machines on the go . . . spot trouble fast . . . with the

SCHROEDER Portable Hydraulic Circuit Tester

Call your nearest dealer.

SCHROEDER BROTHERS
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Nichol Avenue, Box 72, McKees Rocks (Pittsburgh District), Pa.
SPaulding 1-4810

A. L. Kiewit

George W. Biven

A. L. Kiewit and **George W. Biven,** formerly with the Coal Producers Committee for Smoke Abatement, have joined the staff of the Air Pollution Control Div. of the Marketing Dept. of National Coal Association. Both men are residents of Cincinnati and will continue to work from that city. Mr. Kiewit, a graduate of Ohio State University, is a registered professional engineer and licensed stationary engineer with more than 20 yr experience in boiler room and power plant operations, maintenance and testing. He was a testing and research engineer for Cincinnati Gas & Electric Co. from 1928 to 1948, when he became director of engineering for the Coal Producers Committee for Smoke Abatement. Mr. Biven, who retired from the Navy after 23 year as a chief engineer, is a member of the Standard Engineers Society and the National Association of Power Engineers. Since leaving the Navy, he has been active in supervising operations of steam and power plants and as a consultant.

perior Dredging Co. For 40 yr he was an official of Independent Coal & Coke Co., Consolidated Fuel Co., Peerless Coal Co. and National Coal Co.

Joseph Petusky, general superintendent, Reading Anthracite Co.'s Shenandoah stripping, was killed on Jan. 23 when his car slid off a narrow icy road and plunged down an embankment. He was 55.

C. J. Goodyear, 71, died Feb. 8 at Bryn Mawr, Pa. He was a commercial traffic consultant and served as commissioner of the Pittsburgh Coal Producers Association from 1920 to 1925. He was traffic manager of the Philadelphia & Reading Coal & Iron Co. and its subdivisions from 1928 to 1956. Mr. Goodyear was employed by National Coal Association from March, 1957, to September, 1958, as a special assistant in the Transportation Dept.

Kenneth Spencer, founder and chairman of the Spencer Chemical Co. and president since 1943 of the Pittsburgh & Midway Coal Mining Co., died Feb. 20 in Miami Beach, Fla. He was 58 yr old. A graduate of Kansas University, Mr. Spencer began in 1925 as a junior engineer with Pittsburgh & Midway, working his way up over the years. He was a director of numerous industrial firms as well as a director of the National Coal Association, and a member of the AIMME.

Meetings

The Institution of Mining & Metallurgy, International Mineral Processing Congress, April 6-9—London, Eng.

West Virginia Coal Mining Institute, spring meeting, April 22-23— Morgantown, W. Va.

American Mining Congress, 1960 Coal Convention, May 9-11—Pittsburgh, Pa.

Charbonnages de France, International Conference on Strata Control, May 16-20, 1960. Presentation of results obtained from laboratory experiments and underground measurements and observations—Paris, France.

Appalachian Underground Corrosion Short Course, June 1-3, 1960. Fifty-seven classes, 15 new papers and 25 new speakers—West Virginia University, Morgantown, W. Va.

Mine Inspectors' Institute of America, Louisville, Ky., June 12-15.

National Safety Congress, 48th annual meeting, Oct. 17-21—Conrad Hilton Hotel, Chicago.

NOW — A CONVEYOR IDLER PROVIDING TRUE CATENARY SUSPENSION FOR THE BELT

the S-A FLEXIROLL®

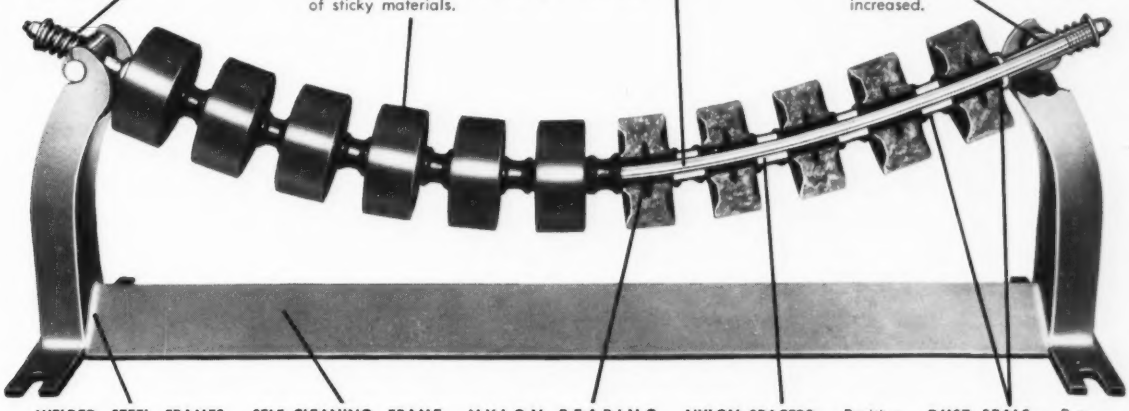
CATENARY CARRIERS FOR BELT CONVEYORS

EASY REPLACEMENT—Shaft, and entire idler assembly simply lifts out of ears in brackets, merely by depressing trunnion spring.

FLEXITEX MOULDED ROLLER—High resistance to abrasion, combustion and chemical corrosion. Cushions impact of material on belt, prevents build-up of sticky materials.

SPRING STEEL SHAFT 85/95 TONS TENSILE—Provides natural troughing with belt under all load conditions. Prolongs belt life.

STEEL TRUNNION & TRUNNION SPRING—Trunnion is offset to provide ease of adjustment for belt training—spring is shock absorbing to flex as load is increased.



WELDED STEEL FRAMES—All steel, deeply-ribbed end stands accurately jig-welded to the stiff angle cross-member.

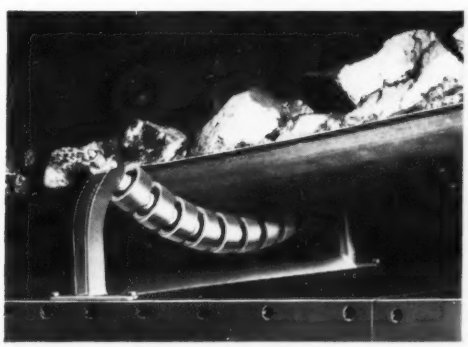
SELF-CLEANING FRAME—Inverted angle cross-member and self-cleaning end-brackets prevent material from collecting and fouling rollers.

NYLON BEARING GRAPHITE IMPREGNATED—Ensures long life without maintenance. No lubrication required.

NYLON SPACERS—Positive connection between rollers is achieved by mating jaws of nylon spacer and bearing of roller.

DUST SEALS—Protects bearings from ingress of foreign matter.

AVAILABLE FOR 18", 20", 24", 30" and 36" BELT WIDTHS



Closeup of a 30" S-A FLEXIROLL Catenary Idler in operation on belt conveyor handling coal. There is no fire risk with the FLEXIROLL and material breakage is reduced to a minimum.

- Resists corrosion, abrasion, grease, flame, oil, clogging and freezing.
- Increases belt training and greatly reduces belt wear.
- Both idler and stand self cleaning—eliminate material build-up.
- No metal to metal contact—flexing of idler prevents dust build-up, eliminating fire risk.
- Flexing action reduces material breakage, prevents spillage.
- One-third the weight of all-metal idlers—saves space, weight in supporting structures.
- Idlers can be changed without stopping the belt.
- Spring steel spindle provides greater strength than steel cable used in many Catenary-Type idlers.
- All-steel flanged and jig welded frames.
- Catenary suspension of the FLEXIROLL carrier supports the belt in a natural arc.

WRITE FOR BULLETIN 260

S-A
ENGINEERED BULK HANDLING SYSTEMS
MATERIALS HANDLING PRODUCTS
SPEEDWALK PASSENGER CONVEYORS
SEALMASTER BALL BEARING UNITS
SPHERCO BEARINGS & ROD ENDS

STANDARD PRODUCTS DIVISION
STEPHENS-ADAMSON MFG. CO.
GENERAL OFFICE & MAIN PLANT, 55 RIDGEWAY AVENUE, AURORA, ILLINOIS

PLANTS LOCATED IN: LOS ANGELES, CALIFORNIA • CLARKSDALE, MISSISSIPPI
BELLEVILLE, ONTARIO

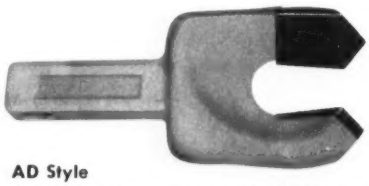
Metallurgical Memo from General Electric

Bit illustrated: CCS-3

Teeth that bite off big tonnage!

the proof of Carboloy® bit life is in the output

That's why so many mine operators now standardize on G-E Carboloy bits



AD Style
Auger Bit (Square and Hex shank). Designed for top performance under all cutting conditions.

CC-12 Style
Enclosed Tip Machine Bit For New Style Block. The carbide tips are enclosed in steel, resist breakout or tip loss. Also available with on-top tip.

You can expect the lion's share of coal to be mined per shift and *get it* with Carboloy mining machine bits. Replacement with these longer-life cutting tools is the best possible protection to the earning power of your equipment.

The quality of the carbide, the extra length of the tips, and the strong braze team up to keep your machines producing longer, where they work and earn. Insist on the genuine Carboloy bits—the silver color tools. Your local Authorized Carboloy Mining Tool Distributor has the right bit for every mining job. He and our local engineer are equipped to give you all the facts, as well as underground assistance. See distributor listing on adjoining page. Call him, or write: *Metallurgical Products Department of General Electric Company, 11145 E. 8 Mile Rd., Detroit 32, Michigan.*

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CEMENTED CARBIDES
METALLURGICAL PRODUCTS DEPARTMENT

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CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS
MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

Complete service through factory and distributor assistance

AUTHORIZED CARBOLOY® MINING TOOL DISTRIBUTORS

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COLORADO
Denver—The Mine & Smelter Supply Company

ILLINOIS
Mt. Vernon—Pickard Industries, Inc., Central Mine Supply Division

INDIANA
Terre Haute—The Mine Supply Company, Inc.

KENTUCKY
Harlan—Kentucky Mine Supply Co., Inc.
Lothair—Speck Cornett Distributor, Inc.
Madisonville—Pickard Industries, Inc., Central Mine Supply Div.
Paintsville—Farmers Supply Co.
Pikeville—Big Sandy Electric & Supply Co.

OHIO
Cambridge—Cambridge Machine & Supply Co., Inc.

OREGON
Portland—J. E. Haseltine & Company

PENNSYLVANIA
Charleroi—Mining Tool Service
Lee Supply Co.
Washington—Fairmont Supply Company

TENNESSEE
Knoxville—Crowell Engineering Company

TEXAS
El Paso—The Mine & Smelter Supply Co.

UTAH
Salt Lake City—The Mine & Smelter Supply Co.

VIRGINIA
Andover—Central Supply Co., of Va., Inc.
McClure—Erwin Supply Company

WEST VIRGINIA
Bluefield—Bluefield Supply Co.
Bluefield—Fairmont Supply Company
Bluefield—Rish Equipment Company
Charleston—Rish Equipment Company
Clarksburg—Rish Equipment Company
Fairmont—Fairmont Supply Company
Montgomery—Marathon Coal Bit Company, Inc.
Shinnston—Erwin Supply Company

Current Coal Patents

By: **Oliver S. North**

Extensible belt conveyor, A. L. Barrett (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Jan. 12, 1960. Improved belt storing and extension arrangement for the drive buggy of a portable extensible belt conveyor system, whereby inversely varying portions of a belt may be paid off. A plurality of devices is provided for reversals of belt direction. No. 2,920,747.

Supporting structure for flexible sideframe conveyor, M. A. Gleason (assigned to Goodman Mfg. Co., Chicago, Ill.), Jan. 12, 1960. Design for an improved structure for supporting the flexible strand means of a flexible sideframe conveyor which will enable the flexible strand means to flex continuously throughout the full longitudinal length of the conveyor in response to variations in load conditions. The structure has a mounting or connecting means which includes a resiliently yieldable biasing arrangement for transversely biasing the strand means against undesirable longitudinal shifting movements. No. 2,920,749.

Reversible training idler, K. W. Couch (assigned to The Jeffrey Mfg. Co., a corp. of O.), Jan. 12, 1960. Belt conveyor training idler that is adapted to be operated in opposite directions and can be reversed in accordance with the direction of travel of the conveyor belt. The idler is supported on an upright pivot axis inclined in the direction of belt travel. Solenoid means is provided for reversing the direction of inclination of the idler whenever the direction of travel of the belt is reversed. No. 2,920,750.

Horizontal screening machine, K. Müller and C. Schmidt, Jan. 12, 1960. In an efficient horizontal machine for screening coal or the like, the screen supporting structure is resiliently mounted in order to produce both a horizontal and a vertical component of movement, thereby sifting the material on the screen and simultaneously advancing it along the screen deck. The direction of throw is readily adjustable, and the deck can be lengthened as desired by adding intermediate sections thereto. No. 2,920,762.

Mining apparatus utilizing two side cutting augers, H. W. Driehaus (assigned to Goodman Mfg. Co., Chicago, Ill.), Jan. 12, 1960. In a machine for mining low coal seams of varying widths, the entire seam is mined by two side cutting augers movable laterally across the coal face in an arcuate path, and the cut coal is withdrawn by the retreating auger and picked up by a gathering device regardless of the position of the retreating auger with respect to the floor. No. 2,920,879.

Slurry pipeline transportation, E. J. Wasp and P. A. C. Cook (assigned to Consolidation Coal Co., Pittsburgh, Pa.), Jan. 12, 1960. Method for transmitting coal slurries over long distances in pipelines without encountering plugging difficulties, particularly when the pipeline is operated intermittently. At the start of the operation a slug of fluid material is provided in the line in advance of the slurry. When stopping operations, a fluid slug is pumped through behind the coal slurry to prevent settling of the coal particles. Specific examples are cited. No. 2,920,923.

Rope sideframe conveyor supporting stand, R. F. Risse (assigned to Goodman Mfg. Co., Chicago, Ill.), Jan. 19, 1960. In a rope sideframe conveyor system, the rope supporting stand provides a pivotal or tiltable connection between the base and the rope supporting arms, so that the arms can tilt back and forth freely relative to the stationary base while still providing proper support for the ropes as they work back and forth along their length. The arms are interconnected with a tie or torsion bar to assure that they will tilt in the same degree and direction. No. 2,921,668.

Troughed conveyor, F. Bainbridge (assigned to Huwood Mining Machinery Ltd., Gateshead-on-Tyne, England), Jan. 19, 1960. Improved construction for an apron conveyor of the type comprising a series of transverse metal slats attached to endless flexible means to form a continuous apron, and turned up at their ends in the manner of a troughed belt conveyor. This conveyor may be advantageously used over long stretches, and is highly resistant to derangement of the apron and its parts during operation. No. 2,921,669.

Rope side frame conveyor clamp, C. J. Arndt (assigned to Goodman Mfg. Co., Chicago, Ill.), Jan. 26, 1960. Design for a clamp for attaching a roller assembly to a rope in which the tapered pin is interlocked with the hanger to prevent unintended disengagement. The pin has a serrated edge interlocked with a shoulder on the hanger, and a relatively smooth edge engageable with the rope. No. 2,922,208.

Supporting structure for flexible strand

sideframe conveyor, R. F. Lo Presti (assigned to Goodman Mfg. Co., Chicago, Ill.), Jan. 26, 1960. Improved supporting structure for flexible strand sideframe conveyors which supports and trains the flexible strand sideframes along a given course with a pivotal-supporting means that enables the structure to be securely attached to the sideframes and longitudinally shiftable therewith relative to the conveyor course. No. 2,922,512.

Apparatus for classifying minerals and other substances by flotation, H. L. Schranz, Jan. 26, 1960. Coal flotation apparatus having a cylindrical or prismatic agitation cell and a pump whereby the mineral pulp is fed to the agitation cell together with air, and, if desired, flotation reagents also. Part of the pulp from the agitation cell is recycled to the cell for re-flotation. The height of the pulp column is maintained 1.5 to 3.5 times the width of the cell. The arrangement of the various parts assures very uniform distribution of air bubbles in the direction of flow of the pulp, thus permitting high throughput of pulp. No. 2,922,521.

Conveyors, R. Milik, Feb. 2, 1960. Improved sectional conveyor comprising a main conveyor and associated sections which can be extended into side areas. The adjacent units are interconnected end to end by a jib to which at least one of the units is articulatingly connected by means of a hollow pivot. Each unit has a power receiving device at one end and a power transmitting device at the other end. The units are completely interchangeable. No. 2,923,398.

Situ recovery from carbonaceous deposits, F. Ljungstrom (one-half each assigned to Svenska Skifferolje Aktiebolaget, Orebro, Sweden, and to Husky Oil Co., Cody, Wyo.), Feb. 2, 1960. In a method for gasification of coal beds in situ, a section of the bed is electrically heated to at least 212°F. but below the temperature of vaporization of oil. The resulting water vapor causes the preheated stratum to become permeable. Combustion is then initiated with an oxygen-containing gas. Products of oil vaporization and pyrolysis are not diluted with water vapor and other undesirable gases, because they have been eliminated in the preheating step. No. 2,923,535.

Impact type cutting device for excavating machinery, W. E. Marshall and E. A. Kathe, Feb. 2, 1960. Design for an improved cutting head for a mining machine. The head is carried into the seam centrifugally at a relatively high rate of speed and at a high degree of impact. Increased cutter head life and lower costs are reportedly realized. No. 2,923,536.

Auger mining section assembly, J. L. Wilcox (assigned to Wilcox Mfg. Co., Raleigh, W. Va.), Feb. 2, 1960. Auger mining section assembly having improved auxiliary toothed cutting chain means operable to square the normally round hole cut by a conventional auger section. Maximum recovery of the coal in the seam is obtained. U.S. Patent No. 2,923,537.

Method of preventing the outbreak of endogenous mine fires, I. Hofbauer, G. Schebor, K. Beran and J. Novák, Feb. 9, 1960. In the prevention of fires in coal mines, a mixture consisting of calcium chloride and a fine clay, e.g., bentonite, is injected in boreholes into the seam to a depth of 3-13 ft., utilizing a special device which prevents the mixture from flowing back out of the borehole. In this method the coal wall is saturated with the mixture, which prevents access of oxygen into cavities, cracks, etc. No. 2,924,279.

MAGNAFLOAT...Foote's specially processed magnetite—has what it takes for fast and efficient heavy-media separation of clean coal from refuse in raw run-of-mine:

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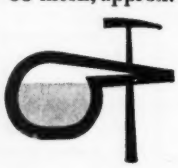

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WEEK OF MARCH 14th...CATERPILLAR ANNOUNCES

THE No. 944 TRAXCAVATOR

...the first of a new wheel loader line

Here's the first of a completely new line of equipment . . . the Cat No. 944 . . . rated at 2 cu. yd. capacity . . . that will soon include the No. 922 (1¼ cu. yd. bucket) and the No. 966 (2¾ cu. yd. bucket).

Watch for these new machines with the bold new design . . . they're ready to bring new standards to wheel loader operation. Take a look at the big new features that make this the easiest and fastest wheel loader to operate.

Designed for action . . . with plenty of power for both machine drive *and* bucket hydraulics. Choose from 2 great new engines . . . the compact, 4-cylinder Cat D330 Diesel Engine, turbocharged for maximum efficiency . . . or the 6-cylinder gasoline engine. Both are 105* HP units. Both are made to the same rigid standards. Whatever the requirements of your operation, there's a No. 944 powered to meet your needs.

Tailored to this power is a torque converter and power shift transmission, providing smooth, instant, finger-tip shifting. A full range of work and travel speeds is available. Travel Range gives 2-wheel drive for roading . . . Work Range automatically puts power to all 4 wheels. Reverse speeds are 25% faster than forward speeds . . . important in reducing cycle time.

Designed for safety . . . in the bold new lines. Bucket lift arms are completely in front of the operator. This gives him new freedom of movement . . . greater visibility.

The No. 944 brake system provides safer, more precise control. The *left* brake neutralizes the transmission as it stops the machine. This gives superior loading action in extra-tough material. The *right* brake leaves the transmission engaged for full control when creeping, working on steep slopes or roading downhill.

Designed for economy . . . sound engineering, modern design, service accessibility, quality construction . . . all add up to a new kind of stability. This is the kind of stability that minimizes maintenance and operating cost . . . keeps the machine working at top production . . . keeps it working profitably.

Visit your Caterpillar Dealer the week of March 14. See for yourself how the No. 944 Traxcavator pays off on your loader jobs.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

**For comparative purposes, the maximum rating of the Caterpillar D330 Diesel Engine used in the No. 944 is 135 horsepower.*

CATERPILLAR

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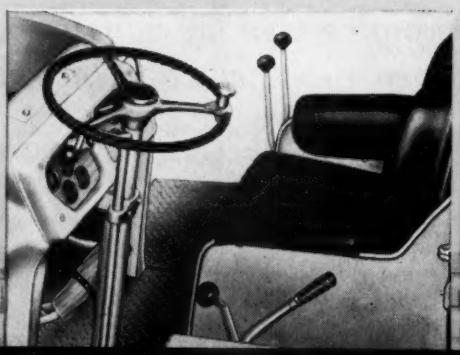
DIESEL ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

A GREAT NEW PRODUCT IN THE CATERPILLAR TRADITION

Wide steps make it safe to get in and out of the No. 944 from either side. No need to climb over tires. Lift arms do not obstruct operator.

The forward-reverse lever is located on the steering column. Both bucket control levers have kick-out devices: lift control releases at dumping height, tilt control positions the bucket for digging.



Fenders provide a handy platform for checking the engine, and they protect the operator from mud and rocks.

BRIEF SPECIFICATIONS

Bucket capacity		2 cu. yd.
Bucket reach (@ 7 ft. dump height)		50¾ in.
Over-all width (bucket)		93½ in.
Wheelbase		88 in.
Speeds, forward (4)		0-24 MPH
reverse (4)		0-30 MPH
Shipping weight	with diesel engine	20,780 lb.
	with gasoline engine	20,440 lb.

There's a wealth of LOADER KNOW-How behind the No. 944.
It comes from the builders of the best accepted track-type tractor-shovels in the field.

The No. 944 is offered with a full line of versatile attachments and accessories... forks, cab (shown here), special buckets ...and the exclusive side dump bucket.

Every feature of the No. 944 is designed for efficient work. Ample horsepower... finger-tip shifting... smooth, fast bucket action... outstanding operator comfort and safety. The result... a bold new wheel loader... the Cat No. 944 Traxcavator.

Coal Abroad

All That's Needed . . . And Then Some

Excesses of coal, oil and gas in western Europe will result in cutthroat competition, declares economic survey group.

AFTER a fresh look at the European energy picture, the Organization for European Economic Cooperation (OEEC), a group of nine independent experts headed by Austin Robinson, Professor of Economics at Cambridge University, predicted recently that western Europe is likely to be up to its ears in fuels through 1975.

This situation, a far cry from the chronic energy gap foreseen by OEEC's Hartley Commission back in 1956, has developed because of big new crude oil and natural gas discoveries in the past few years in the Sahara and elsewhere. The new energy pattern indicates growing competition among fuels and a shrinking market for coal.

Demand Up—Primary energy requirements, according to the experts, will be up between 25 and 30% by 1965 and possibly 80% by 1975. In terms of coal equivalent, this means a boost from about 810 million tons in 1958 to between 970 and 1,050 million tons in 1965 and 1,225 and 1,425 million in 1975.

Free Hand—Viewing these prospects, the economic organization suggested that western European nations stop favoring uneconomic home fuel production for security reasons and allow free flow of low-cost energy to the consumer. Even nuclear energy, OEEC declared, may not justify today's planned investments, given overabundance of traditional energy supplies in the next 15 yr. Above all, it was urged that the European nations insure fair competition among different fuels, unhampered by protection, price-fixing or discriminatory taxes.

Coal's Future—While OEEC sees oil's share of the energy market rising from 25% today to 35% by 1975, and gas moving up from a negligible cut to 10% of the total 15 yr from now, the economic group believes coal's share of the market will continue to shrink—this as a result of rising costs, reflected in higher consumer prices. The trend, it was felt, could be checked somewhat by closing marginal pits and concentrating production in economic basins, by leaving flexible coal prices and stockpiling.

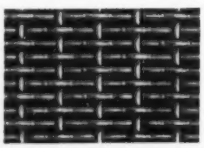
Nuclear Power—After warning that research on nuclear power must not stop development of traditional fuels, which will supply the bulk of Europe's energy needs for a very long time, OEEC judged that construction and fuel costs in nuclear plants will drop faster than those of conventional thermal stations. Thus, it stated, nuclear power will start to be competitive with other energy toward 1970.

Overseas Flashes

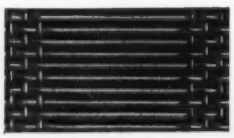
AUSTRALIA—This country's major coal-producing state, New South Wales, registered a drop in coal output in 1959. Production fell 180,000 tons to 15,670,000 tons, but underground production's share increased and it accounts now for about 15.2 million tons a year. Australian coal exports for the year totalled 772,800 tons, of which Japan took 502,100 tons, the remainder going to Korea, Argentina and New Caledonia.

FRANCE—Despite the European coal crisis, 1959 was an excellent year for this nation's coal industry. Production

When you order screens, be sure to specify the type which best meets your requirements. For example:



For maximum through capacity, CF&I Space Screens with rectangular openings are recommended. The high percentage of open area provides considerable freedom from blinding or clogging.



For maximum freedom from blinding or clogging, CF&I Long Slot Space Screens are the most efficient construction. Because of the open area and intense vibration of wires on the long sides of the openings, material can not cling or build up.

The Image of CF&I offers

SPACE SCREENS

for every coal screening operation

For economical, general screening specify Wisscoloy screening made from special alloy steel. Carefully crimped and tightly woven, Wisscoloy is a rugged, general-purpose screen which provides long service on average jobs.

For corrosive conditions specify CF&I stainless steel screens. These durable screens are ideal for washing and other operations where wet, corrosive material is processed.

For scalping operations specify CF&I manganese screens. Rugged and shock resistant, they withstand the crushing, tumbling and pounding common in scalping operations and similar tough screening applications. Made of ¼" or heavier wire, they reduce costly downtime.

For engineering assistance in choosing the right space screen for your coal screening operation, contact our nearest branch office.

6924 B

CF&I SPACE SCREENS

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In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte Denver • El Paso • Farmington (N.M.) • Ft. Worth • Houston • Lincoln • Los Angeles • Oakland • Oklahoma City Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • San Leandro • Seattle • Spokane • Wichita
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New holding power . . . because V-R's new Style M7T Red Bit provides double locking security by combining the holding power of a taper type shank and retainer pin.

Quick change design plus the longer lasting V-R carbide reduces bit changing time to an absolute minimum. The high rake angle allows faster and freer cutting action.

Quality carbide . . . plus engineering knowledge . . . plus complete V-R service add up to increased daily production.

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Thermit Welding is now the simplest and speediest of all rail welding methods — just line up rail ends, fasten on a pair of molds, pour in and ignite the Thermit, and, move on to the next joint. Five or six minutes is all it takes to make a strong, sound weld that will stand up indefinitely in main haulage track; always have 100% conductivity. With modern Thermit Welding, no time is lost in preheating rail ends prior to welding — there's no heavy equipment to haul into the mine. Materials come in "Self-Weld" kits, each kit containing everything needed to make one weld. And, the cost is amazingly low—compares favorably with that of bolted joints with bonds.
Write for more information.

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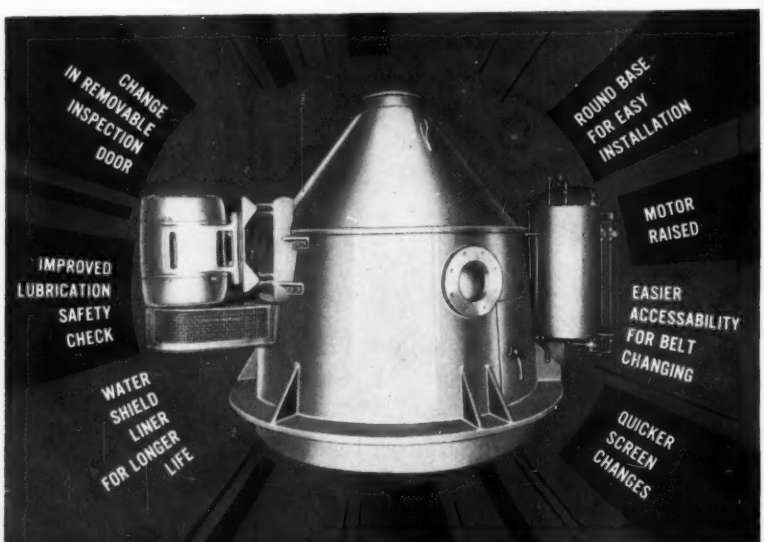
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CMI has developed, for the 1960 Model EB-36 Coal Dryer, several significant improvements. Among these are the raising of the motor for easier installation and the redesigning of the removable inspection door for ready access to the interior.

The 1960 EB-36 Dryer is a precision-built, excellently machined, dependable dryer which will reduce 35% surface moisture in coal to less than 5% at the rate of 65 tons or more per hour.

CMI service is available from any one of three strategic locations.

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Coal Abroad *(Continued)*

dropped less than 1% from the record level of 1958, imports were slashed, output per man shift hit a new high, and the French national coal authority, Charbonnages de France, reported it was out of the red for the first time in 8 yr. Production was 59,775,000 metric tons, a drop of only 264,000 tons from the all-time high of 60,039,000 tons set in 1958. Coal production is expected to remain at the 1959 level in 1960 and probably until 1965.

CZECHOSLOVAKIA—This nation exported 4,116,575 tons of coal and coke to 16 countries last year. Of this, 1,726,571 tons were exported to "capitalist" countries. Compared to the previous year 84,935 more tons of hard coal and 59,415 more tons of brown coal were exported. Last year's coal and coke exports to western Europe were 14% higher than in 1958.

ITALY—Italian coal imports during the first 10 mo of 1959 dropped to 6,438,609 metric tons from 7,422,764 metric tons for the same period of 1958. While the full year's figures are not available yet, value-wise for the 10 mo, imports decreased from $127.2 million in 1958 to $97.3 million in 1959.

JAPAN—A 60,000-ton order from Japan for western Canada's largest underground coal mine at Michel, B. C., has been confirmed by T. G. Ewart, president of the Crow's Nest Pass Coal Co. The new order is a direct follow-up to a 55,000-ton coking coal order Japan placed with the Canadian company last May.

RUSSIA—Siberia's total fuel and energy resources are estimated at 1,271,000 million metric tons of "standardized" (coal equivalent) fuel or 71% of the total USSR fuel and energy resources, this country reported recently. Siberia also possesses 54% of all hydro-power resources. This vast energy potential makes Siberia the natural area for industrialization, especially since rich mineral and ore reserves were found in this area, said the Russian report.

SARDINI—The coal of the Sulcis Basin on the island of Sardinia, estimated at 670 million metric tons, will be put to use after years of idleness. The Italian Ministry of Participations, which owns the coal bed, has approved construction of a $75 million thermoelectric power plant in Porto Vesme, southern Sardinia, near the coal bed. The project includes the building of a power line to carry electric energy from the island to the Italian mainland.

EAST GERMANY—Late report—15 men dead, 100 trapped in Karl Marx mine.

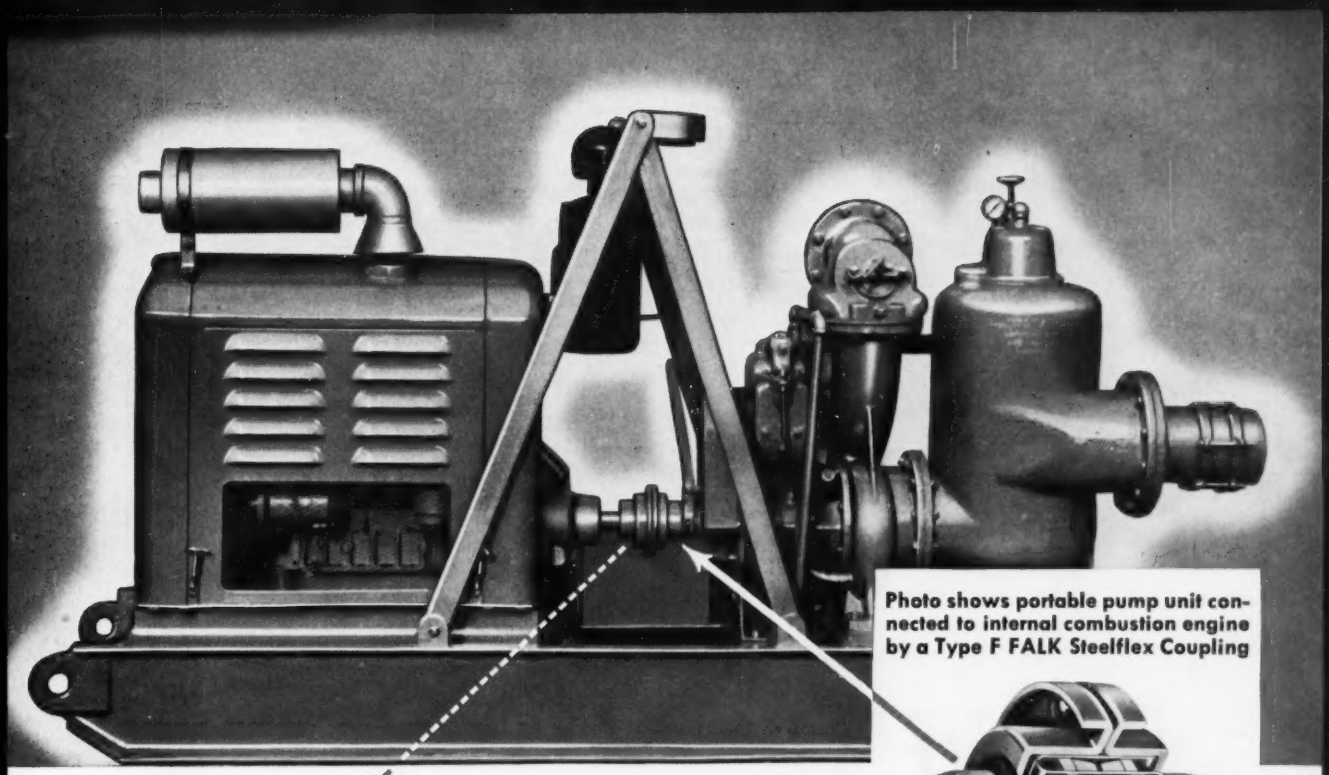

Photo shows portable pump unit connected to internal combustion engine by a Type F FALK Steelflex Coupling

How FALK STEELFLEX Couplings give your connected machinery Double Protection

FIRST: *They protect against shaft misalignment.* Some degree of shaft misalignment is unavoidable—and unless protective compensation is provided, additional loads are developed on shafts, bearings and other revolving elements. The result is excessive wear-and-tear—and often actual breakage....FALK Steelflex Couplings compensate for either angular or parallel misalignment—*or for the more serious condition involving both!* The exclusive Steelflex gridmember which joins the two hubs is not fastened to either hub; thus, either hub can shift in any direction without imposing a load on the other hub.

Yet, important as protection against shaft misalignment is to you, it is only one function of the *truly flexible* FALK Steelflex Coupling.

SECOND: *They protect against torque fluctuations* which create excess wear on connected machines and frequently induce destructive shaft misalignment. The exclusive FALK Steelflex grid-groove design cushions shock loads, dampens vibration, reduces impact loads as much as 30 per cent. You get this extra margin of protection that *can mean the difference between operating and breakdown!* You save on maintenance costs. And —you prolong the service life of your machines!...For complete information, ask your FALK Representative or Authorized Distributor. Or— **write direct for Bulletin 4100.**

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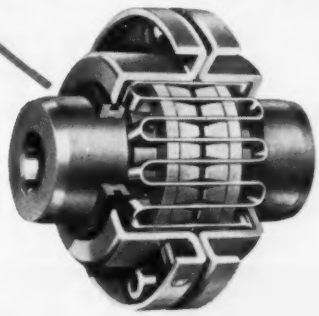

Basic Type F FALK STEELFLEX COUPLING fills the needs of 90% of industrial applications

This cutaway view shows the exclusive Steelflex design which provides *torsional resilience with the strength of steel.* This torsional resilience spreads peak or shock loads over a relatively long increment of time, thus *greatly reducing stresses* in connected machinery.

The versatile Type F Steelflex can be used horizontally or vertically, without modification or special parts. It is ideally suited to 9 out of 10 applications. For unusual applications involving overload conditions, extended shafts, brakes, etc., standard designs of dual-purpose Steelflex couplings are available.

For most applications, you can give your machines the extra protection afforded by FALK Steelflex Couplings at no extra cost!

FALK

...a good name in industry

Tough, versatile and fire-resistant, Du Pont neoprene synthetic rubber is playing an ever-growing role in coal mine operations. The reason? Safety and long-term economy. You see, only neoprene stands up to so much use—and abuse—in such a wide range of applications. No other rubber has neoprene's balanced combination of properties . . . resists so many deteriorating factors.

ABOVE GROUND OR BELOW . . .

Above ground, neoprene thrives on rough treatment. Because it shrugs off the ravaging effects of sunlight and weather, neoprene is ideal for extended outdoor service in any climate. It withstands exposure to oil, grease, chemicals. Aging's no problem, either. Neoprene cable, hose and belting often last years without a sign of a crack.

NOTHING DOES THE JOB LIKE NEOPRENE!

Underground, neoprene takes punishment just as readily. On conveyor belts it resists abrasion, tearing, gouging . . . protects against fabric damage from acid mine water, mildew or mold . . . does not support combustion. And neoprene jacketing on trailing cable withstands severe heat-buildup; won't soften at temperatures as high as 250° F.

Have your local rubber goods distributor specify neoprene the next time you order conveyor belting, trailing cable, hose, gaskets and other rubber items. E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department CA-3, Wilmington 98, Delaware.

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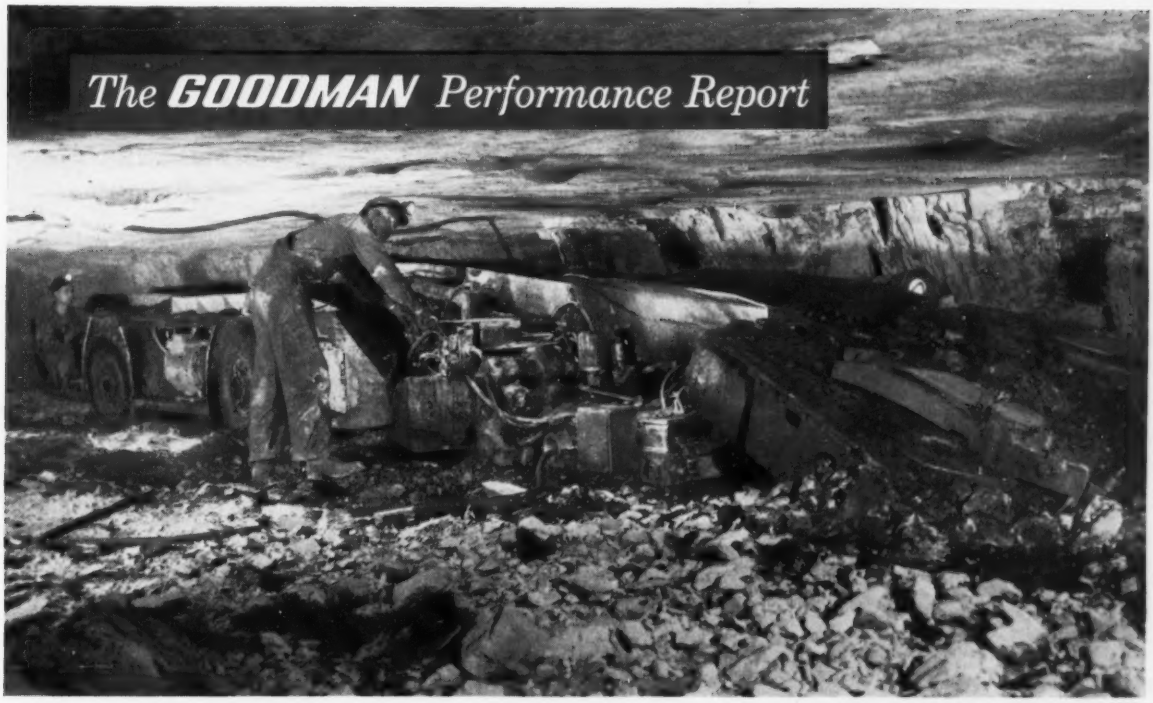

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How to pick up your profits

In a conventional cycle or behind continuous miners, your loaders can make the difference between a marginal or a profitable operation. They can be key units to high level face efficiency and full utilization of your haulage system. That's why high loader capacity, fast maneuvering, and durability are so essential—why Goodman Loaders (AC or DC) are so often chosen for low, intermediate or high work. And not only in coal but also in gypsum and potash.

Goodman Loaders can really pick up your profits! With the capacity to gather up material at a fast rate, they keep machines moving ahead and behind. The fast, powerful action of the gathering arms puts bulky or fine materials onto the conveyor in a steady flow—and the two mechanically joined head motors provide constant, even power under all loading conditions. The two head motors, as well as the two for tramming and hydraulic system, are Goodman designed with high continuous rating and, when of the same horsepower, are identical and interchangeable.

Response to hydraulic controls is immediate and smooth—good road clearance, coupled with 12" wide treads, permits free movement on soft or heavy bottom—and the gear-driven, clutch-controlled tramming allows fast maneuvering at the face.

Construction is rugged throughout—design simple. The minimum number of moving parts are readily accessible for routine care or overhaul without disturbing hydraulic or electrical controls.

With Goodman Loaders you can be sure of maximum efficiency, output, and more important—maximum return for dollars invested.

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Capacity and low maintenance highlight Goodman Loader performance in this gypsum mine.

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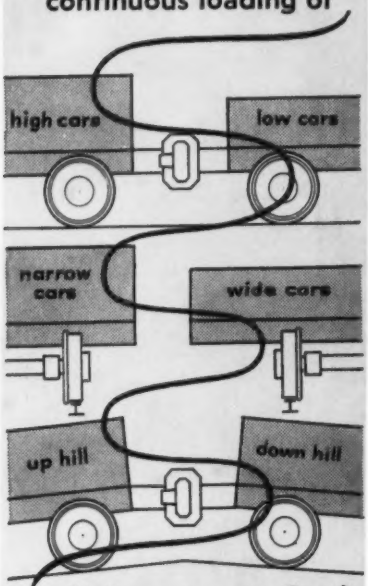
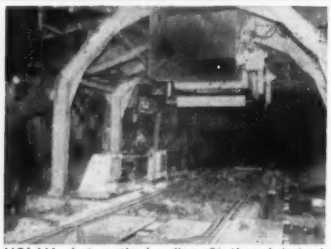
assures positive
continuous loading of



all in one trip!



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No stopping—no stalling
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New Books

New Coal Standards

Compilation of ASTM Standards for Coal and Coke supersedes the 1957 edition and contains methods of testing, specifications and definitions for both coal and coke. It is of particular interest to utilities, exporters and importers of solid fuels, transportation companies and process industries. *136 pp. 6x9-in; cloth. $3.00, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.*

Welding Guide

Aircomatic Welding Wire Pocket Guide includes the latest information on Airco's complete line of gas-shielded metal-arc welding wires, including data on the improved A675 steel wire, the new A666 steel and A556 aluminum. The guide contains technical information such as chemical composition, mechanical properties, operating procedures as well as wire diameters and packaging data. *80 pp. 4x8-in; paper. Air Reduction Sales Co., 150 E. 42nd St., New York 17, N.Y.*

Welding Rod Charts

Filler Metal Comparison Charts contains the most complete set of welding rod and electrode comparison charts ever published. The brand names of 78 companies are listed. With the aid of the charts it is possible to see at a glance the classification in which a filler metal belongs, regardless of brand name or number. *48 pp. 8½x11-in. $2.50, The American Welding Society, Dept. T, 33 W. 39th St., New York 18, N. Y.*

Engineering Careers

Engineering, by Edward H. Robie is designed to provide answers to many questions about the engineering profession. The booklet is addressed primarily to high school students, their parents and vocational counselors. Some of the main topics discussed include types of work, number employed in the various branches of engineering, qualifications necessary to enter the profession, colleges and estimated costs per year, and engineering salaries. *36 pp. 6x9-in; paper. $1.00, Bellman Publishing Co., P. O. Box 172, Cambridge 38, Mass.*

European Technology

European Technical Digests offers at a glance the latest technical developments in Europe. Every month over 1,000 technical journals appearing in 13 different countries and 11 different languages are searched by engineers for information on new processes, methods, apparatus or materials which could be readily employed in industry without large capital investment. *6x8¼-in; paper. Yearly subscription $12.00, European Productivity Agency, Organization for European Economic Cooperation, 2, Rue Andre-Pascal, Paris, France.*

German Methods

Streckenausbau in Stahl, by Fritz Spruth (in German). This work describes and illustrates the various ways steel is used for supporting openings in German mines. *256 pp. 6x8-in; cloth; Verlag Gluckauf GmbH, Essen ,Germany.*

Handbuch der Mechanisierung der Kohlengewinnung, compiled by Heinz Kundel (in German). A handbook of mechanical mining methods in Germany. *135 pp. 6x8-in; cloth. Verlag Gluckauf GmbH, Essen, Germany.*

Roof Bolting in France

LeBoulonnage des Roches en Souterrain, by A. Hugon and A. Costes (in French). A comprehensive study of roof bolting methods in France, including bolting theory, bolting materials, bolt tension and testing methods. *180 pp. 6x9½-in; paper. 3,147 francs in France; 3,035 francs, foreign. Editions Eyrolles, 61 Boulevard Saint-Germain, Paris 5.*

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EXPLORATION FOR MINERAL DEPOSITS
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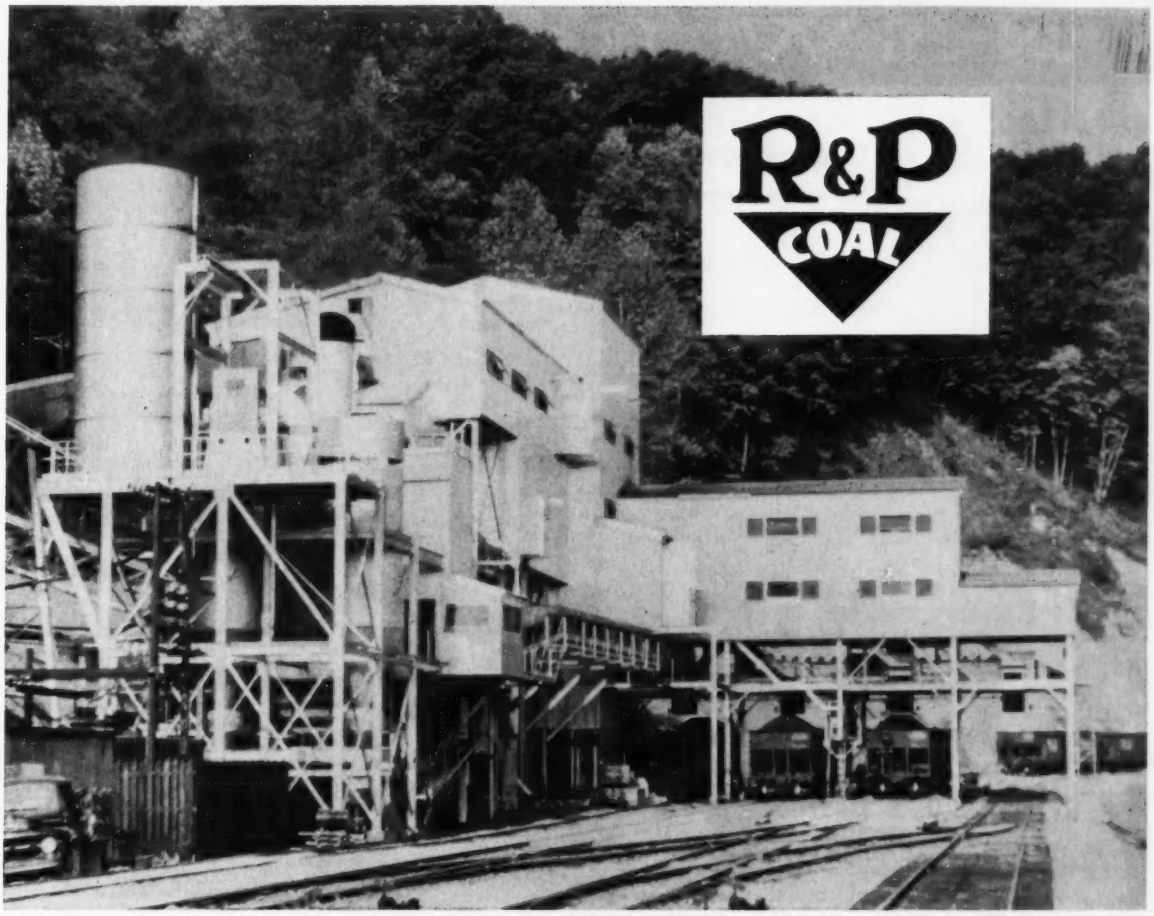

Rochester & Pittsburgh Coal Company's O'Donnell Mine No. 2 Preparation and Thermal Drying Plant for 400 TPH of 5" x 0 Coal. 3 Compartment—8 Cell Air Operated Jig, H & P Cyclones, Reineveld Fine Coal Dryers, Vacuum-Filter and H & P Fluid Bed Dryer.

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The new Coal Preparation Plant at O'Donnell Mine No. 2 is operating satisfactorily after an exceptionally short breaking-in period. Good results and smooth operating conditions were expected by Rochester & Pittsburgh Coal Company's management when they decided to install many of the products of Heyl & Patterson's research program for advanced coal preparation machinery and processes.

The Rochester & Pittsburgh Coal Company says:

"The flexibility built into this plant is already paying off. Even with fluctuating feed conditions, the product is low in ash and moisture. As a result, unexpected marketing opportunities have opened up."

Discuss your new coal preparation requirements with H & P engineers whose experience is at your disposal to conceive a preparation plant best suited to your own operating and marketing conditions.

Whether you require a turn-key job or prefer a cooperative effort—remember:

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NEW 24" LOW

Fletcher ROOF CONTROL DRILL with 51" FEED

Delivers ALL the FEED YOU NEED in a Drill designed especially for LOW COAL

A REMARKABLE DESIGN BREAK-THROUGH

in this entirely new Fletcher LOW Roof Control Drill provides the dependable, high-thrust, straight-from-the-floor feed of the telescoping mast with TWICE the flexibility — TWICE the height range — of former machines. Add the following all-new advantages and you'll see why we think it's the finest low-coal drill on the market today.

1. 5 full inches of underclearance.
2. Just 7" of lost feed. (½ the previous minimum).
3. Stall-proof, four-wheel full speed-range drive, with traction-type steer.
4. Built-in *internal* dust collection with our new easy-empty large capacity tank.
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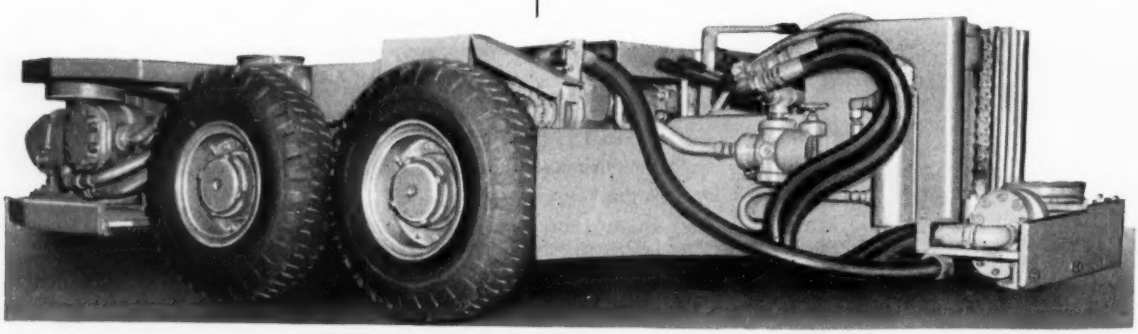
6. Over *twice* the traction, *twice* the torque and more thrust than ever before.
7. Can be equipped for rotary impact drilling where required.



Call us for more information on the new model DBE Fletcher LOW Roof Control Drill.

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THE ONLY WORLD WIDE PROVED SYSTEM

40 INSTALLATIONS in 15 COUNTRIES

THE DUTCH STATE MINES HEAVY MEDIUM CYCLONE WASHER

Available in the United States exclusively from

ROBERTS & SCHAEFER

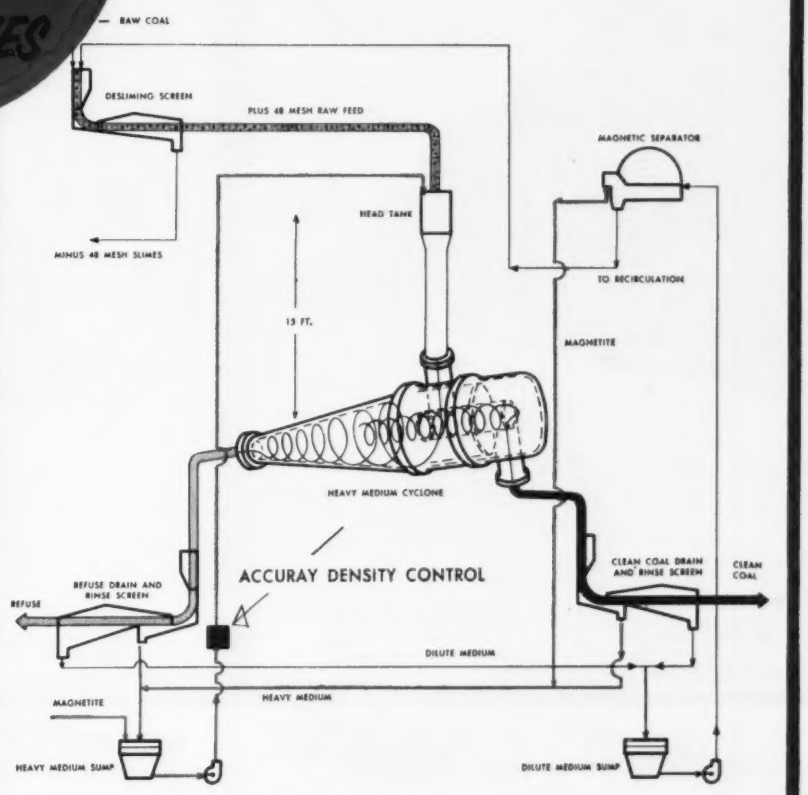
If you are facing the necessity of upgrading the quality of your fine coal to meet the exacting requirements of today's market, you can install the Dutch State Mines Heavy Medium Cyclone Washing System with complete confidence.

It is the only cyclone washing system proved sound, practical and efficient by successfully operating plants in many countries. It is the only system that gives you the advantages of the technical knowledge and experience of the Dutch State Mines engineering organization.

The Roberts & Schaefer technical staff handles all details of engineering and construction of Heavy Medium Cyclone Washing Plants . . . with the continuing collaboration of the Dutch State Mines engineers on installations in United States.

The Dutch State Mines Heavy Medium Cyclone Washer is available in the United States exclusively from Roberts & Schaefer. Call or write us for detailed information.

FLOW DIAGRAM OF HEAVY MEDIUM CYCLONE WASHING SYSTEM



"Accuray" IS THE REGISTERED TRADE MARK OF INDUSTRIAL NUCLEONICS CORPORATION

Cleans Fine Coal Cleaner Than Any Other Cleaning System

- Delivers coal with higher Btu, lower ash.
- Maintains rigid uniformity of quality.
- Obtains maximum recovery of fine coal.
- Washes at any specific gravity you want.
- Holds magnetite consumption to a minimum.
- Operates at highest efficiency regardless of size distribution, particle shape or percentage of near gravity material.
- Produces no measurable degradation of the coal.
- Assures effective specific gravity separation independent of viscosity due to accelerated shearing forces within the cyclone.
- Operates at maximum efficiency through all ranges of capacity.

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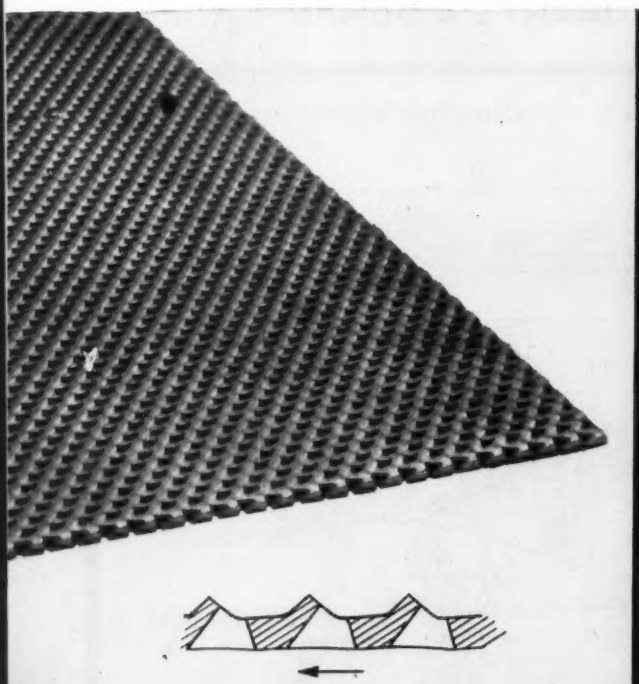
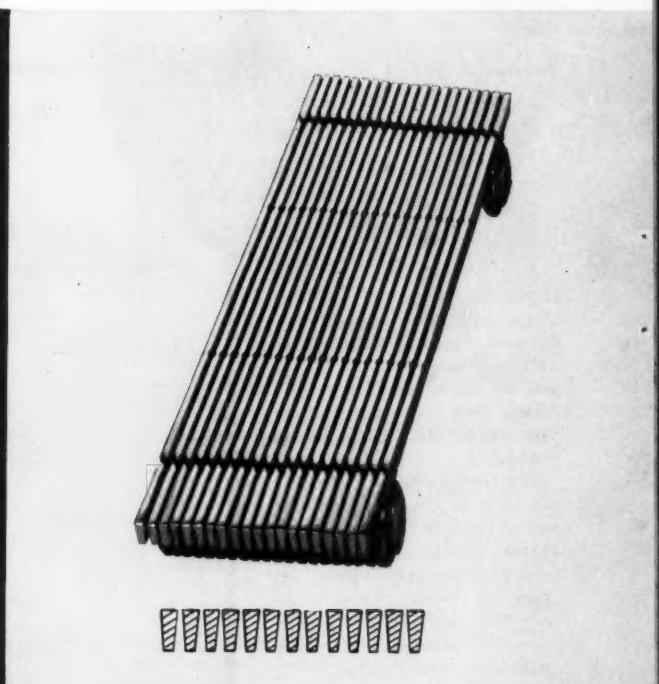
from **NATIONAL-STANDARD**

NEW CONCEPT IN SCREENING



CONIDURE* sheets are available in a complete range of hole sizes and rolled surfaces. The working side of Conidure sheets has shovel-like humps that guide material into the narrow openings, increasing screening action. The extreme taper of the hole prevents clogging or blinding.



RIMA* screens can be supplied as rectangular, oblique angled, round or oval beds. The complete range of slit widths and wire profiles accommodates a wide variety of screening and filtering operations.

New **CONIDURE** *Screens*

New Conidure sheets are produced by a unique process of piercing trapezoidal-shaped holes, highly tapered in the screening direction. Sheet thickness can be several times greater than hole diameter for higher capacity and longer wearing life in coal, sugar and chemical centrifuges or on vibrators, separators and screening machines.

*®by Hein, Lehmann & Co., Dusseldorf, Germany

New **RIMA** *Screens*

New Rima shaped-wire screens for coal, paper and food processing and water or sewage filtration have special capacity advantages over standard wedge-wire screens because of high-narrow profile wires that provide larger open area. The unique cross bar and spacing lugs keep wires uniformly separated for greater efficiency in screening.

FOR COMPLETE INFORMATION on New Conidure and Rima Screens, write for new illustrated catalog to NATIONAL-STANDARD COMPANY, NILES, MICHIGAN

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NS NATIONAL-STANDARD COMPANY

Cross Perforated Metals

NATIONAL-STANDARD COMPANY

Carbondale, Pa.

Style GR, cylindrical insert

HR Style, 1½" gage stop

JN for continuous miners

HJN recovery auger bit

G Style, straight shank

Style GN, notched shank

JC Coimol and Boring bit

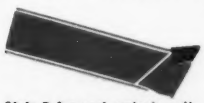
GV, for Joy GV-6111 chain

KN Style, chisel-nose tip

HN Style, 1½" gage stop

Style A straight shank

Style C for impurities



Style D for coal, potash, salt

Style E for Goodman Borers

Style CC, milled shank

L Style for Bowdil ML chains

CARMET OFFERS 25 STYLES OF MINING TOOLS

for every condition you have

Carmet carbide mining tools get high-tonnage production because they're precision made to meet specific mining operations. Hard, tough grades of carbide are induction brazed to high alloy, heat treated shanks in a way that insures maximum tool life. Cutter bits are designed for shortwall, longwall, universal machines and continuous miners of every make. Drill bits drill clean, straight holes at fastest speeds. Carmet distributors keep a complete line of Carmet Mining Tools in stock for prompt delivery. Carmet field engineers are always on call to help you solve tool problems and cut mining costs. Take advantage of their know-how now.

NEW CARMET MINING TOOL CATALOG NOW AVAILABLE FROM YOUR CARMET DISTRIBUTOR

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Offices: Buffalo, Rochester & Syracuse, N.Y.
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U. S. Steel Supply Co., Pittsburgh, Pa.
W. B. Thompson Co., Iron Mountain, Michigan
Vanguard Equip. & Supply, Chicago, Ill.

The newly revised 5th Edition of the Carmet Mining Tool Catalog contains application data and specifications on the complete line of Carmet Mining Tools, including a complete section on grinding and reconditioning. For your copy, write Carmet Division, Allegheny Ludlum Steel Corporation, Detroit 20, Michigan.

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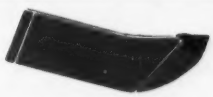
N Style special clearance bit

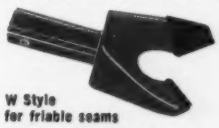


O Style for rotary head miners

R Style finger bits

Style UL coal drill

Style VL drill bit



W Style for friable seams

WW Style, power and hand drilling

T and TT Styles for roof bolting

S and SS Roof Bolting drills

The Original DOUBLE-BONDED Carbide Cutter Bit

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Master of all jobs around your mine...

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. . . Hauls men, material, tools. . .

Surprising how many and varied the jobs that will turn up when this "work horse" is available. It's rugged too.

4 Wheel Silent Drive.
Hydraulic airplane type Disc Brakes to act directly on both axles.
Ball Joint Suspension System.
Speeds to 15 MPH when necessary.

Dash and windshield removable for long pipe, posts and lumber.
You'll wonder how you ever got along without it.

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Length	10 ft. 6 in.
Width	77 in.
Height	22 in.
Est. Gross Weight	3000 lb.
Empty Weight	1900 lb
Horse Power	5

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ELECTRIC & MACHINE CO.
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Our Specialty—
Repairing, Rebuilding,
all underground mining equipment.

News Roundup *(Continued)*

tory-processing plants, schools, hospitals, office buildings, and related markets.

The plan was outlined in detail at a meeting of the Mid-West Coal Producers Institute by Barton R. Gebhart, vice president of Freeman Coal Mining Corp., Chicago. He is chairman of the National Coal Association's Bituminous Coal Institute Subcommittee.

Mr. Gebhart explained that the "primary function" of BCI, a division of the Association's Marketing Dept., will be to expand markets in new construction and to persuade present consumers of gas and oil to convert to coal. He said that the BCI engineering staff, which operates in all coal-consuming states, will begin at once to work with coal producers and sales companies toward this objective.

"Coal's favorable position from a cost standpoint gives us a decided edge in soliciting new business," Mr. Gebhart declared. "Equally significant is the reserve outlook, inasmuch as the present life indexes of oil and gas in the United States do not extend through the remainder of the century, while there is enough mineable coal in the ground to last more than a thousand years at present rates of production."

Mr. Gebhart said that the new industry program serves notice that "we are taking our place beside America's other great industries by recognizing the basic role played by marketing in the success of any industry or company."

News Roundup (to p 59)

Mfgr's of Parts For Mining Machinery

Mine Car Wheels Rebuilt To Better Than New

"Now there's a tool that's really strong and tough..."

The new, REVERSIBLE RATCHET BIT WRENCH

Pat. Pend'g

Speeds Bit Changing On All Mining Machines Using ¾" Set Screws . . . Handle Takes Over 500 lbs. Pull.

- **Reversing ratchet changes direction of stroke in an instant.**
- **No removing of wrench to loosen or tighten set screws.**
- **Solid, forged steel handle—18⅝" long.**
- **Saves up to ½ hr. per shift on changes.**

Here's the only bit wrench made that changes direction of stroke without removal. Assures strong, positive loosening or tightening even when side clearance is only ½". Dust tight . . . accurate . . . solid, one-piece, forged steel. Box-wrench on one end for "sledge-hammer" jobs.

Write for illustrated literature and prices — FREE

NORTH AMERICAN GEAR CO., 39 E. Campbell St., Blairsville, Pa.

Preparation Facilities

Ideal Elkhorn Coal Co., Robinson Creek, Ky.—Contract closed with The Jeffrey Manufacturing Co. for a No. 200 unit washery to handle 140 tph of 5x¼ coal.

Virginia Iron, Coal & Coke Co., Toms Creek, Va.—Contract closed with The Jeffrey Mfg. Co. for a No. 100 unit washery to handle 50 to 75 tph of 4x¼ coal.

The Southeast Coal Co., Irvine, Ky.—Contract closed with The Eimco Corp. for one 10½ ft x 12 in disc Agidisc filter, with Roots-Connersville vacuum pump and blower; one vacuum receiver, one moisture trap and a 3x9-in Eimco-Krogh filtrate pump. Equipment is to be installed at plant in Cala, Ky.

G. A. Stiles Co., Lucinda, Pa.—Contract closed with The Irvin-McKelvy Co., for storage bins, conveyors, sizing screens and mechanical slate ejectors to handle 150 tph.

Kentucky Mountain Coal Co., Manchester, Ky.—Purchase authority granted to The Daniels Co. for a complete DMS dense-media preparation plant.

Princess Coals, Inc., Panther No. 5, Richwood, W. Va.—Contract closed with Fairmont Machinery Co. for design of a 135-tph fine coal cleaning plant with thermal drying, including conveying equipment, four Double-Deck Deister tables, dewatering vibrating screens and mechanical and thermal dryers.

Buckeye Coal Co., Nemacolin, Pa.—Contract closed with Nelson L. Davis Co. for a Neldco 107 Type SF processor to replace present equipment for treating 5x¼-in sizes at a rate of 225 tph. Completion date is June 15, 1960.

In addition to those shown in the 1960 annual summary (*Coal Age*, Feb., 1960, pp 82-83) the following contracts in which the Fuel Process Co. participated arrived too late for inclusion:

Green Coal Co., Panther, Ky.—Belknap chloride washer, 160 tph.

Guardian Coal Co., Gilmore, W. Va.—McNally-Pittsburg feldspar-jig unit, 60 tph.

Hi-Hat Elkhorn Mining Co., Hi-Hat, Ky.—Kanawha-Belknap chloride washing equipment, 30 tph (Kanawha Mfg. Co., contractor).

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LOCOMOTIVE FRAME PARTS

JOURNAL BOXES and SAND VALVES

Now Available

Offering a complete line of locomotive frame parts that feature journal boxes, sand valves, springs, plates and gibs. Manufactured of durable materials that fit accurately yet effect attractive price savings. Simple, adjustable bronze thrust plate assures improved box design. Gibs for any frame thickness and springs to suit special requirements can be furnished. Sand valves and journal boxes in most sizes, now in stock. Complete pattern equipment for sand box bottom available.

We carry a large stock of brake shoes for any type locomotive.

Prompt Delivery from Stock

Flood City BRASS & ELECTRIC COMPANY JOHNSTOWN, PA.

TAKE YOUR PICK!

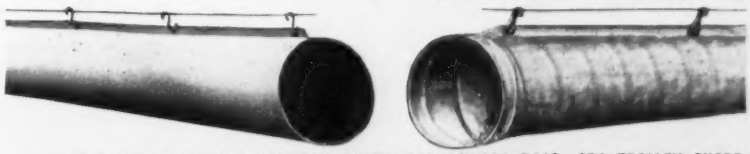
(WE ARE IMPARTIAL)

ABC MineVent Tubing

Some mine operators prefer to blow fresh air to the working face. They choose ABC's standard blower tubing. They like ABC's choice of Snap-on Couplings or Sewed-In Couplings and choice of suspension. They vote for ABC tough, long-lasting materials and careful workmanship. All standard lengths and diameters. Yellow for safety.

ABC Wire Reinforced Tubing

Some mine operators prefer to pull out foul air from the working face. They like ABC Wire Reinforced Tubing. Durable. Spring wire spirals are easy to compress for moving or storage. Two types—exposed wire insert for low pressures and covered wire insert for higher pressures. Choice of coated fabrics. Easy to couple and hang.



MANUFACTURERS OF: ABC BRATTICE CLOTH, ABC POWDER BAGS, ABC TROLLEY GUARD

SEND FOR CATALOG 59.

AMERICAN BRATTICE CLOTH CORPORATION

200 Argonne Road • Warsaw, Indiana

Why walking dragline owners TAKE THE JOBS THEY WANT!

Unfortunately, many people don't know a whole lot about walking draglines. We say unfortunately because *where walking draglines apply*, nothing — and that means no machine built in America today outside the wheel excavator — can move earth at such low cost. How low? Four cents . . . six cents . . . or eight cents a yard, and that is cheap! That's why walking dragline owners *take* the jobs they want.

Here's why dirt-moving costs are lower: The walker sits on a "tub" that gives it great flotation. It walks on a simple, giant system of beams which lift it up . . . move it ahead . . . set it down. Maintenance is low compared to *any* crawler excavator. The life span of a walker is literally unknown. The rigs don't wear out as fast, therefore have greater resale value.

The extra stability of a walker lets you use longer booms, work a greater area from each set position, reducing the number of moves. For a like investment, you can get a bigger capacity walker than crawler — you move more dirt per hour per dollar invested.

How mobile is a walker? Walkers travel at about half the speed of comparable size crawlers, but maneuver much faster because in reality they don't have any maneuvering problems that compare. You don't turn a "tub" around to maneuver! You simply *swing* around, the legs go with you, and move out wherever you choose. The time saved makes up for the slower travel speeds.

How do you make the choice? In simplest terms, the walker is best where flotation is a major problem, where deep digging and long reach are required, or where you have huge quantities of material to be moved at the lowest possible cost per yard.

Walkers don't need or use mats in soft ground. You don't have profits tied up in used mats when the job is done. Walkers have stability that allows them to work in precarious locations out of the question for crawlers.

Don't misunderstand. The walking dragline won't cure all excavating cost woes. There are jobs where crawler machines are better by far. And, there are jobs where you will throw away profits by using anything *but* a walker.

If there's a question in your mind, and you are interested in making a good profit on a job, you should know the facts before you make an investment. We'll welcome the opportunity to talk more about *how* walkers work . . . *where* they work best.

We may tell you *not* to buy a walker. Remember, Bucyrus-Erie builds crawlers, too.

(For answers to questions, write Bucyrus-Erie Company, Dept. 2L60, South Milwaukee, Wisconsin.)

CLEANING AND WIDENING of drainage canal in bayou country of southeast Arkansas is sticky job for Kenyon Construction Corp. Kenyon is handling it with his Bucyrus-Erie 480-W walking dragline equipped with a 15-yd. bucket, 160-ft. boom. Machine is handling between 6,000 and 12,000 yds. per station. Contract was awarded on a bid of 7.6¢ per yard.

BUCYRUS ERIE®

...the most respected name in the field

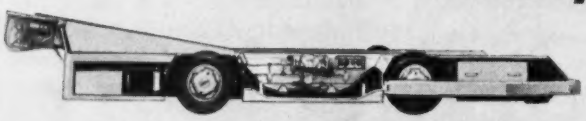
NATIONAL MINE SERVICE COMPANY

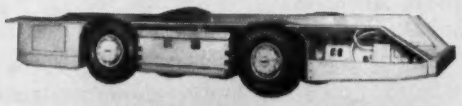
In 1959...the third

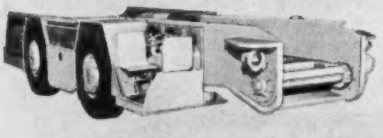
FAR MORE TORKARS

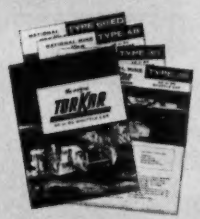
than any other

THE COMPLETE *TORKAR* LINE









TYPE 26—D.C. or A.C.

Engineered for performance in thinnest commercially-workable seams—overall body height only 25½". Capacities from 120 to 167 cubic feet.

TYPE 30—D.C. or A.C.

With heights from 30" to 36"—ideally suited to low seam work. Capacities 120 to 167 cubic feet in standard units. *Wide Car* models have up to 24" additional width, with capacity increased accordingly.

TYPE 48—D.C. or A.C.

With heights from 40" to 54"—Type 48 offers capacities from 155 to 290 cubic feet in standard units. *Wide Car* models have increased capacity through addition of up to 24" extra width.

TYPE 60—A.C., D.C. or Diesel

Now available in new electrically-powered models, this is the largest and most powerful TorKar type. Capacities: Type 60 A.C. or D.C., 375 to 455 cubic feet; Type 60 ED Diesel (for non-coal mining), 295 cubic feet.

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year of manufacture...

SOLD to the mining industry

make of shuttle car

Essential reasons behind this Trend to TorKars: lowest cost per ton of material handled—with dramatic records of performance and low maintenance wherever they are used.

TorKars are unique in that they are powered by a single, large-capacity motor in place of small multi-motors required on conventional shuttle cars.

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Coal in Picture

British Columbia Electric Co. has tossed new cards on the table in the game of how and where electric power will be generated for the province of Vancouver, British Columbia . . . and by whom.

The company announced it had paid almost $2 million for coal deposits at Hat Creek in the interior of the province and that a steam plant costing $200 million would be built to use the deposits totalling 340 million tons.

Until British Columbia showed its coal hand, the power tussle was limited to who would get rights to supply hydropower in the area. The Peace River Development Co. plans to start operations on the Peace River to produce 4,200,000 hp. Only other competition for the Peace River project had been expected to come from a publicly-owned operation on the Columbia River, in which the United States is vitally interested, because the river punctures the U. S. border and an international rights question thus arises.

In British Columbia, several observers say that one of the developments would be sufficient to supply the power needs of Vancouver Province while the Government believes both the Peace River and Columbia River projects will be needed to supply the area's needs by 1968. With coal now on the scene, the issue is triply confused. Cost-wise, British Columbia Electric may have a trump hand.

Upholds Ruling

The United States District Court for the Dist. of Columbia has upheld the Secretary of Labor's order forbidding Capitol Coal Sales Co. from doing business with the government on charges of violating the Walsh-Healy Act. The Court denied Capitol's request for an injunction against the Secretary of Labor.

The case originated when the Labor Dept., after an investigation and hearing, ruled that Capitol Coal Sales and H. A. Worley, an individual doing business as Worley Coal Co., violated the Walsh-Healy (minimum wage) Act.

The examiner recommended they be listed as ineligible to do business with the government. This ruling was upheld in March, 1957, by the wage-hour administrator and the Secretary of Labor. Capitol Coal Sales won a temporary injunction July 29, 1958, with a proviso that it would not enter into government contracts before the case was heard. Nevertheless, Capitol continued to sell coal to TVA during 1958.

TVA maintained that the firm was merely a sales agent for the producers

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By Control of Top Size — Crushing to size in one operation eliminates recirculating load . . . saves time and equipment . . . increases overall plant capacity.

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By Flexibility . . . Can handle larger lumps and frozen coal . . . hand wheel adjustment allows you to fill any order down to ¾" top size . . . orders heretofore uneconomical to fill are now yours.

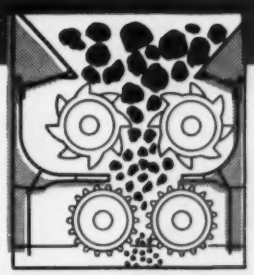
By Dependability . . . Ever-increasing list of satisfied users.

By Economical Operation . . . Less maintenance . . . Less H.P. per ton of crushed coal . . . One Crusher . . . Lower initial investment . . . No wasted labor in adjusting crusher.

YOUR CUSTOMER BENEFITS...

By Control of Top Size . . . Less unburnt coal in ashes . . . More BTU output per ton . . . Lower ash handling costs . . . Greater overall utilization.

By Less Fines . . . Simplifies unloading . . . increases boiler efficiency.



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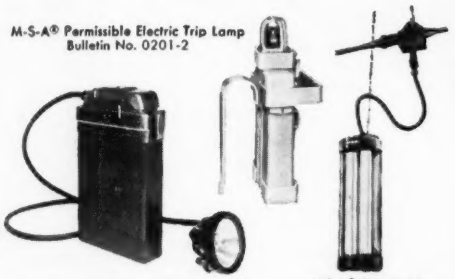
ILLUMINATION

M-S-A® Permissible Electric Trip Lamp
Bulletin No. 0201-2



New Edison Model S Electric Cap Lamp
Bulletin No. 0201-6

M-S-A® Permissible
Mine Lighting System
Bulletin No. 0201-4

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M-S-A® Footwear
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M-S-A® Work Gloves
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M-S-A® Safety Belts
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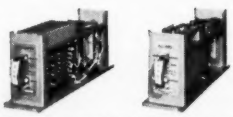
M-S-A® CHEMKLOS®
Bulletin No. 1309-1

M-S-A® Goggles
Bulletin No. 0301-8

M-S-A® Eye Shields
Bulletin No. 0302-3

COMMUNICATIONS



M-S-A® Transistorized Audio Tone Transmission
Equipment—Bulletin No. 1600

M-S-A® MinePhone*
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M-S-A® Mine Rescue Communication System
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Mine Fire Truck
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Mine Fire Truck
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M-S-A® Mine Fire
Control Dry Chemical
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M-S-A® Mine Fire Hose Bulletin No. 1203-2

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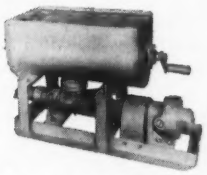
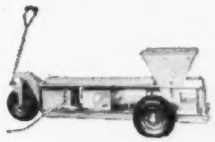
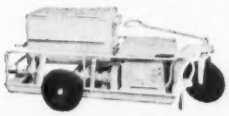


M-S-A® Model 80 Slurry Rock Dust Distributor—Bulletin No. 1201-6



M-S-A® Bantam 400 Rock Dust Distributor Bulletin No. 1201-2



M-S-A® Slurry Rock Dust Distributor Bulletin No. 1201-4

M-S-A® THRU-STEEL* Dust Collector Bulletin No. 1207-1

RESPIRATORY PROTECTION

M-S-A® Self-Rescuer® Bulletin No. EC-1

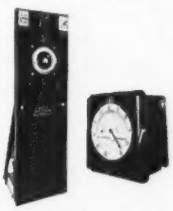
M-S-A® Dustfoe® 66 Respirator Bulletin No. 1004-3

M-S-A® CHEMOX® Breathing Apparatus Bulletin No. B-14

M-S-A® McCaa® Two-Hour Breathing Apparatus Bulletin No. BB-3

METHANE DETECTION

M-S-A® Methane Alarm Bulletin No. 0809-2



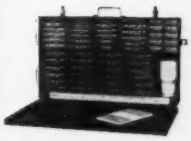
M-S-A® Methane Recorder Bulletin No. 0706-1

M-S-A®-Wolf Junior Flame Safety Lamp Bulletin No. 0807-1

M-S-A® Methane Detector Type W-8 Bulletin No. 0809-4

M-S-A® Methane Tester Type M-6 Bulletin No. 0809-3

FIRST AID EQUIPMENT



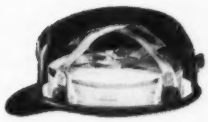
M-S-A® Miner's First Aid Cabinet Bulletin No. 0401-2

M-S-A® Jenkins Stretcher Bulletin No. 0408-10

M-S-A® Emergency First Aid Outfit Bulletin No. 0408-10

M-S-A® Unit First Aid Kits Bulletin No. 0401-2

HEAD PROTECTION WITH FIXED-CROWN* SUSPENSION

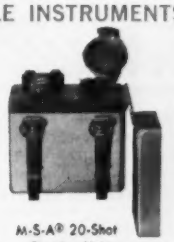


M-S-A® Comfo Cap® Bulletin No. 0601-3

M-S-A® Type K SKULLGARD® Hat Bulletin No. 0601-4

PORTABLE INSTRUMENTS

M-S-A® Portable Oxygen Indicator Bulletin No. 0817-1



M-S-A® 20-Shot Blasting Unit Bulletin No. 0901-4

M-S-A® Carbon Monoxide Indicator Bulletin No. DS-3

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News Roundup *(Continued)*

and not a party to the contracts. Presumably, TVA and all other government agencies will be notified that Capitol is on the list of those ineligible to contract with the government, and will abide by the decision of the Court.

Mines, Companies

Stonefort Corp. has officially changed its corporate name to Stonefort Coal Mining Co., Inc.

Lehigh Valley Coal Co. has reportedly offered to convey to the city of Wilkes-Barre all the company's right, title and interest to underground coal in the Wilkes-Barre area in return for certain special tax consideration.

Old Ben Coal Corp. announced it would close its No. 22 mine at Valier, Ill., and drastically reduce operations at its No. 14 mine at Buckner, Ill.

The announcement will affect Franklin County coal-mining economy which was hit around the first of the year by a reduction of some 300 men at the Orient mine of Freeman Coal Co., at West Frankfort, Ill. Old Ben reported that 225 men have been working at the Valier mine. At Buckner the work force is to be reduced from the present 220 men to about 60, according to the announcement. The company said the Buckner mine would be temporarily closed this month to permit recovery of surplus equipment in sections to be abandoned, but would be opened again when the demand for summer coal shipping over the Great Lakes resumed. Old Ben officials said "poor natural" mining conditions and a high reject of coal mined at Valier combined to defeat efforts to keep the mine operating.

Utilization

TVA is restricting receipt of truck coal deliveries at its Kingston, Tenn., steam plant to daylight hours as a safeguard against fraudulent coal deliveries.

Deliveries by four haulers are suspended and probably will remain so until TVA lawyers decide, after studying an FBI report, whether to bring civil action against the truckers for alleged "layer loading" of coal. The truckers are suspected of buying "dust" coal at Brushy Mountain State Prison for as little as 50c a ton and mixing it in with acceptable coal for sale under contract prices ranging from $4.50 to $4.75 a ton. E. C. Hill, TVA's coal procurement chief, said an investigation found that apparently there was a greater effort to deliver this "unsatis-

factory coal" during the second-shift hours from 4 to 10 p. m. Even with the "best lighting arrangements," he said, it is more difficult to detect low-grade coal during those hours than during the rest of the day.

TVA plans to build a new steam plant in southeastern Kentucky or in eastern Tennessee near the Kentucky line, according to a report.

The report said this would ultimately mean a market for 4 million tons of coal annually in East Kentucky.

Exposure to atomic radiation alters the physical and chemical characteristics of certain coals, but leaves most varieties substantially unchanged, the Bureau of Mines reported recently in announcing preliminary results of its first efforts to determine effects of irradiation of bituminous coal.

It was noted that irradiation does make coal harder and this effect might ultimately make possible manufacture of stronger coke. In certain ranks of bituminous coal, it was added, irradiation disturbs the delicate electrical balance within the coal molecule, making the coal react more readily with other materials and thereby permitting improvements in processes for converting coal to liquid fuels and chemicals. The Bureau said it will make every effort to push its coal research, requesting $250,000 from the Government for the year beginning July 1, to strengthen its program. Marling J. Ankeny, Bureau director, said work has been started on development of a stationary coal-burning gas turbine which would provide a method of increasing the efficiency of steam-generating equipment.

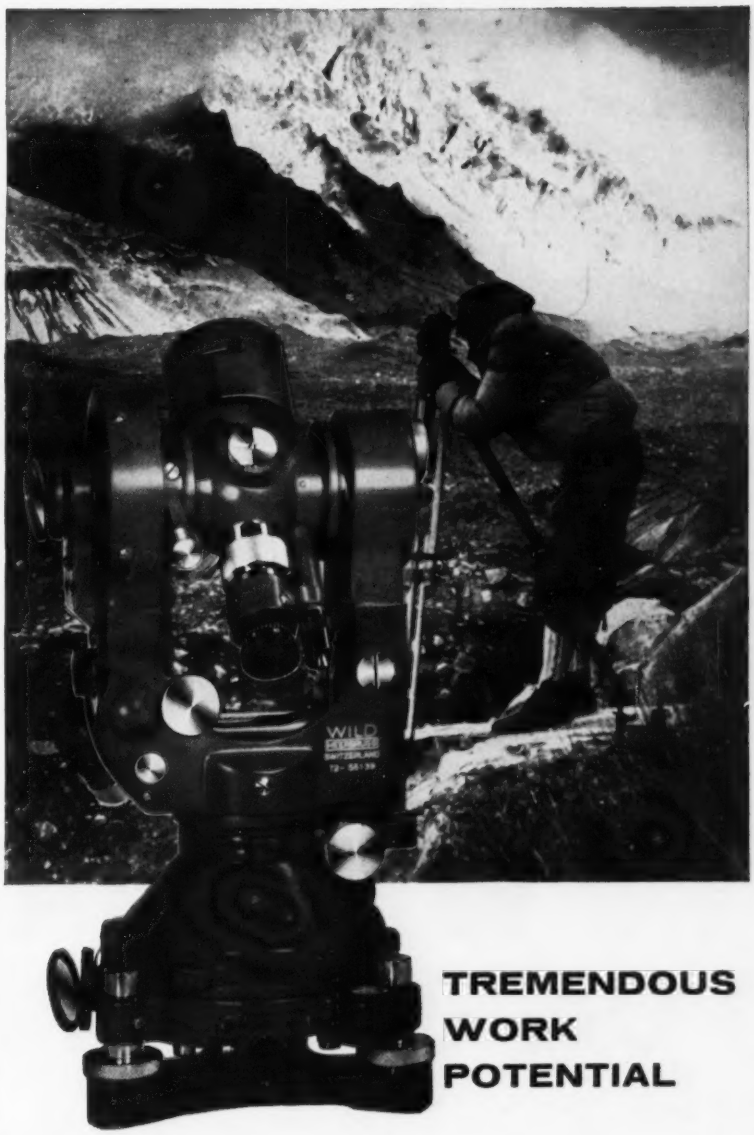
An Inter-State Commerce Commission examiner recommended recently that the commission approve conditionally reduced volume rates on coal to electric utilities along the eastern seaboard from Baltimore north.

This proceeding, the so-called New York Harbor case (ICC Docket 32871 and related cases), arose from a rate reduction initiated early last year on coal receipts in excess of certain minimum annual tonnages from mines in Appalachian fields to utility plants on the east coast. When the reduced rates were announced last year it was estimated that the utilities would require almost 20 million tons annually, and that the reduction of 50c per ton would apply on about half this coal.

Equipment Approvals

Thirteen equipment approvals were issued by the U. S. Bureau of Mines during the month of January.

J. H. Fletcher and Co.—Types DJA and



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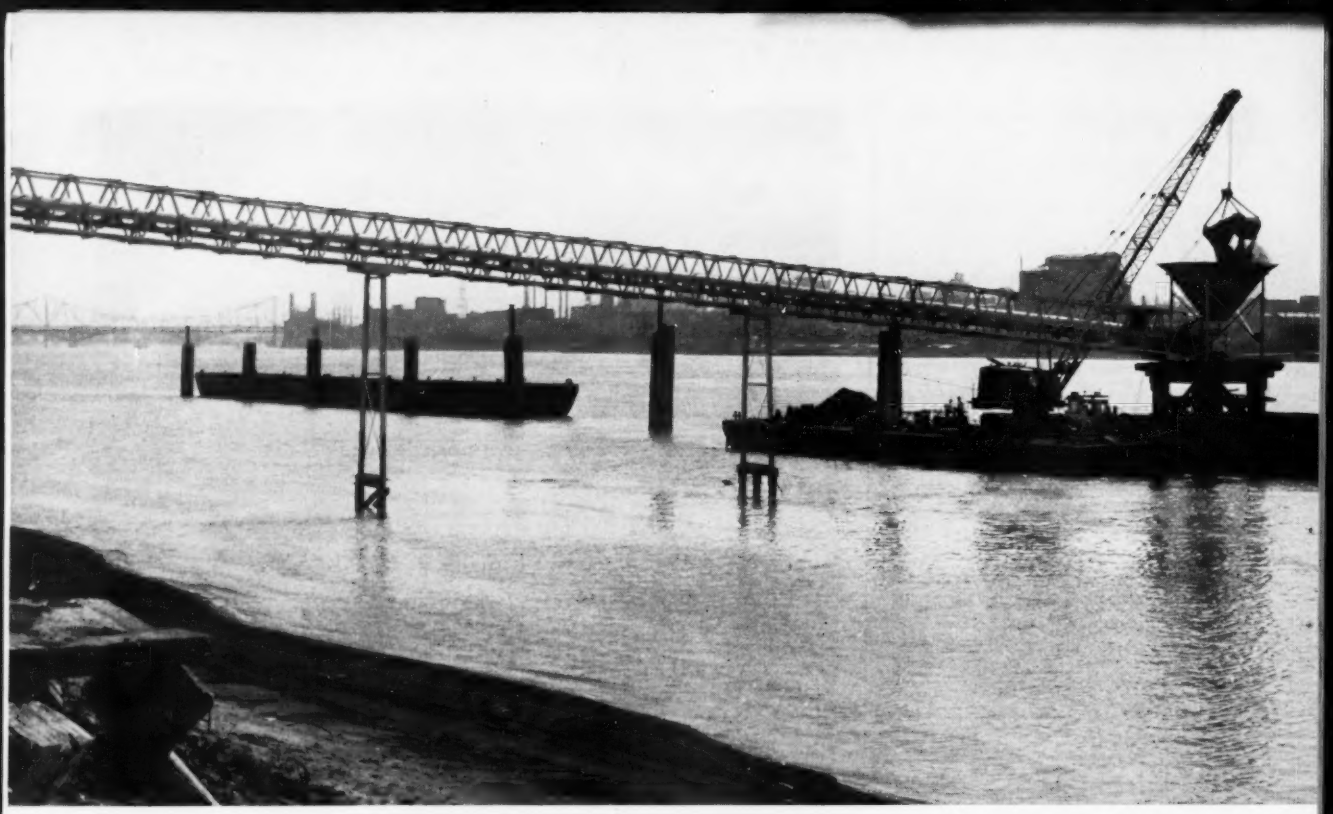

Huge gallery truss spans part of Mississippi River carrying coal from barges to stockpile on shore.

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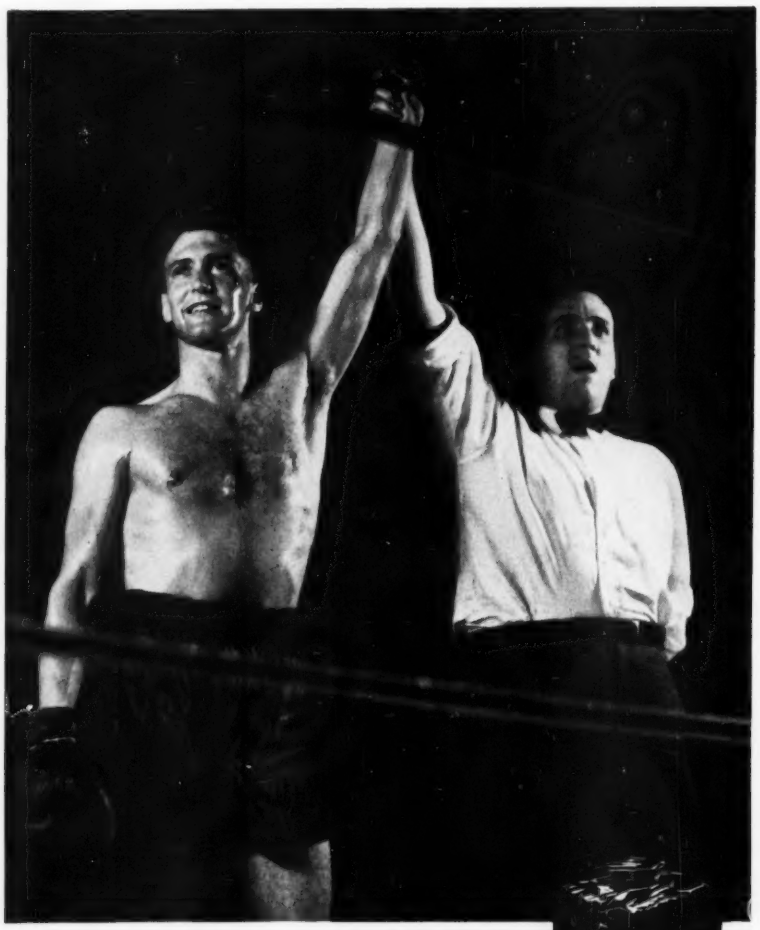
IT'S *the decision* THAT COUNTS



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DJF roof control drills; one motor, 50-hp, 220-/440-V, AC. Approvals Nos. 2F-1523 and 2F-1523A, Jan. 7.

J. H. Fletcher and Co.—Types DJC, DJD, and DJE roof control drills; one motor, 50-hp, 220-V, AC. Approval No. 2F-1346, Jan. 8. (Approval No. 2-1346A covering the 50-hp, 440-V, AC design of the DJC and DJD roof control drills was issued on March 31, 1958.)

Joy Mfg. Co.—Type 14BU10-2BH loading machine; six motors, two 15/25-hp and four 20-hp, 440-V, AC. Approval No. 2F-1524A, Jan. 12.

Columbus-McKinnon Chain Corp.—Model RF-55 ratio feeder conveyor; one motor, 20-hp, 440-V, AC. Approval No. 2F-1525A, Jan. 12.

Ensign Electric & Mfg. Co.—Type GGG distribution box; three 100-amp breakers, 440-V, AC. Approval No. 2F-1526A, Jan. 15.

Galis Electric & Machine Co.—Model 320 rotary roof drilling machine; one motor, 20-hp, 250-V, DC. Approval No. 2F-1527, Jan. 18.

J. H. Fletcher and Co.—Type DBE-C4 roof drill; one motor, 10-hp, 240-V, DC. Approval No. 2F-1528, Jan. 19.

Dooley Brothers—Model RBD-30 roof bolting drill; two motors, complete machine rated 5½-hp, 220-/440-V, AC. Approvals Nos. 2F-1529 and 2F-1529A, Jan. 21.

Ensign Electric & Mfg. Co.—Wheel-mounted distribution box; 4-circuit, 550-V, DC. Approval No. 2F-1530A, Jan. 26.

Joy Mfg. Co.—Type 5CM-2AH continuous miner; four motors, three 15-hp and one 100-hp, 440-V, AC. Approval No. 2F-1531A, Jan. 28.

Bituminous Output

YEAR TO DATE	PRODUCTION
Feb. 13, 1960	52,705,000
Feb. 14, 1959	51,442,000

1960 output 2.5% ahead of 1959.
A month earlier output was 0.3% ahead of 1959.

WEEK ENDING	PRODUCTION
Feb. 13, 1960	8,335,000
Feb. 14, 1960	8,175,000

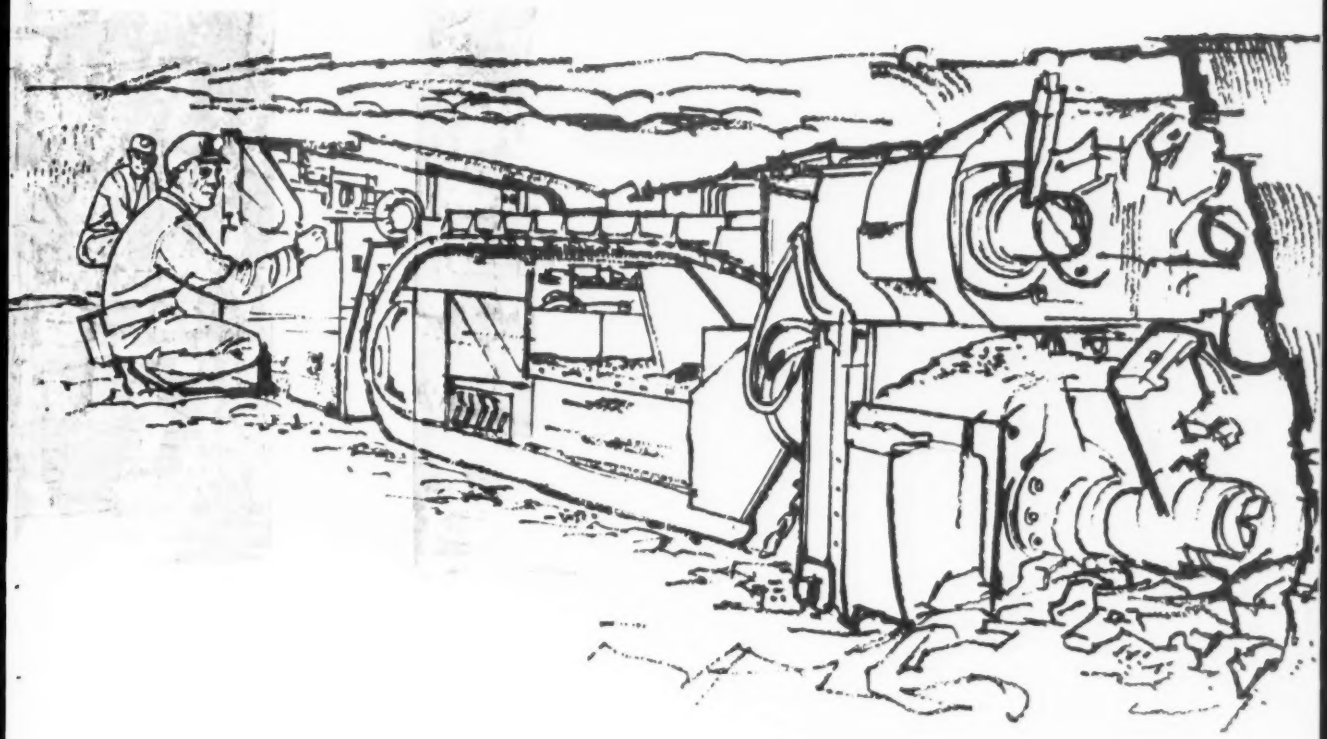
Anthracite Output

YEAR TO DATE	PRODUCTION
Feb. 13, 1960	2,362,000
Feb. 14, 1959	2,936,000

1960 output 19.6% behind 1959.
A month earlier output was 31% behind 1959.

WEEK ENDING	PRODUCTION
Feb. 13, 1960	345,000
Feb. 14, 1959	366,000

There are four types of Jeffrey Colmols®



THE PAYOFF: A NEW HIGH IN EFFICIENCY WITH THE COLMOL THAT FITS YOUR OPERATION TO A "T". JEFFREY DOES IT WITH FOUR BASIC TYPES, AND A NUMBER OF COMBINATIONS OF INTERCHANGEABLE COMPONENTS.

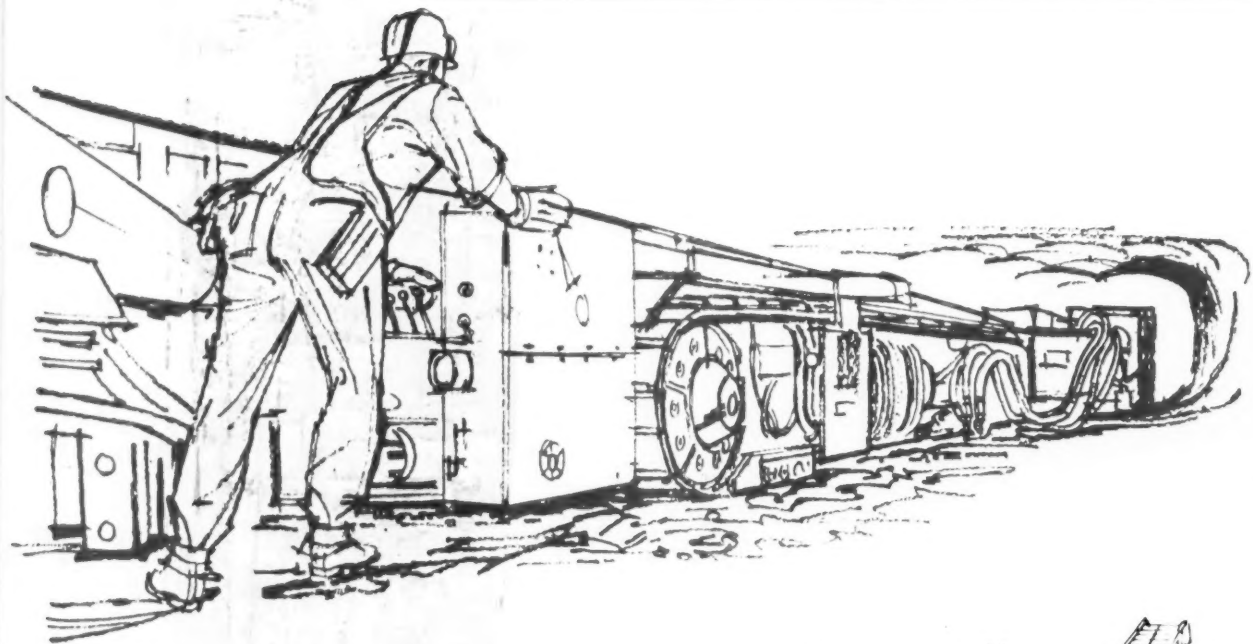
JEFFREY

JEFFREY CONTINUOUS MINING MACHINES

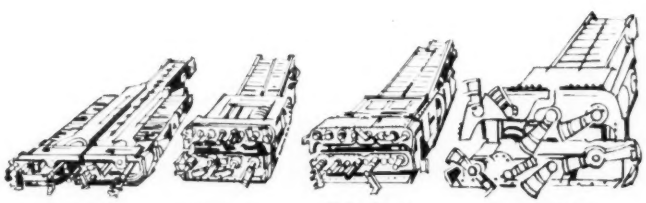
GENERAL SPECIFICATIONS

	86-A	76-AM	76-BM	76-CM
Maximum mining height	44″	60″	77″	96″
Minimum mining height	28″	38″	50½″	67″
Width of cut	14′-7″	9′-8″	10′-9¾″	10′-9¾″
Minimum tramming height	25¼″	34½″	48¾″	63¾″
Width over crawlers	10′-0½″	72″	77″	77″
Length	34′-3″	29′-5½″	33′-10″	33′-10″
Tramming speed (feet per min.)	22′	20′	20′	20′
Feed speed (inches per min.)	0″ to 51″	0″ to 36″	0″ to 36″	0″ to 36″
Electric motors (total HP)	190	150	190	250
Weight—approx. (lbs.)	92,000	56,000	73,000	75,000

Voltage: Colmols can be built for operation on any of the following voltages: 250 V or 500 V, DC; 440 V, 3-ph, 60-cy., or 415 V, 3-ph, 50-cy., AC.

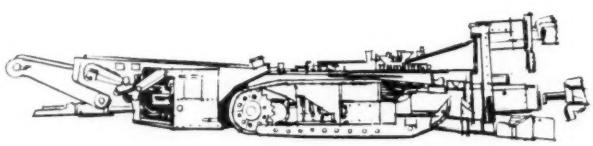


1 RANGE — Choose from four basic types. Variations within each type give the range that's ideally suited for your operation. You pay for what you need—and that's all.



86-A 76-AM 76-BM 76-CM

2 CONTROL — Colmol mining is controlled mining. The operator is in full command, gets smooth, immediate, positive response from electric-hydraulic controls . . . centralized for convenience, safety, easy access . . . located so that the operator has an unobstructed view of cutting and discharge operations . . . minimum operator fatigue.



3 CAPACITY — Loading rates vary with hardness of coal, impurities in the seam, condition of roof and floor, as well as other factors. Colmol's boring principle of cutting and breaking while advancing in the coal with a minimum of waste motion, assures highest loading rates with maximum face time. Want highest possible tonnage? Then you want Colmols!

[redacted]

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Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

COAL AGE

MARCH, 1960

IVAN A. GIVEN, EDITOR

Chemicals From Coal

Early 1960 brought a sudden and significant jump in the number of organizations processing coal for carbon, chemicals and gas, quite possibly setting the stage for a breakthrough or breakthroughs on the chemical front that could convert the possibilities of millions of tons of additional business into actualities in the relatively near future.

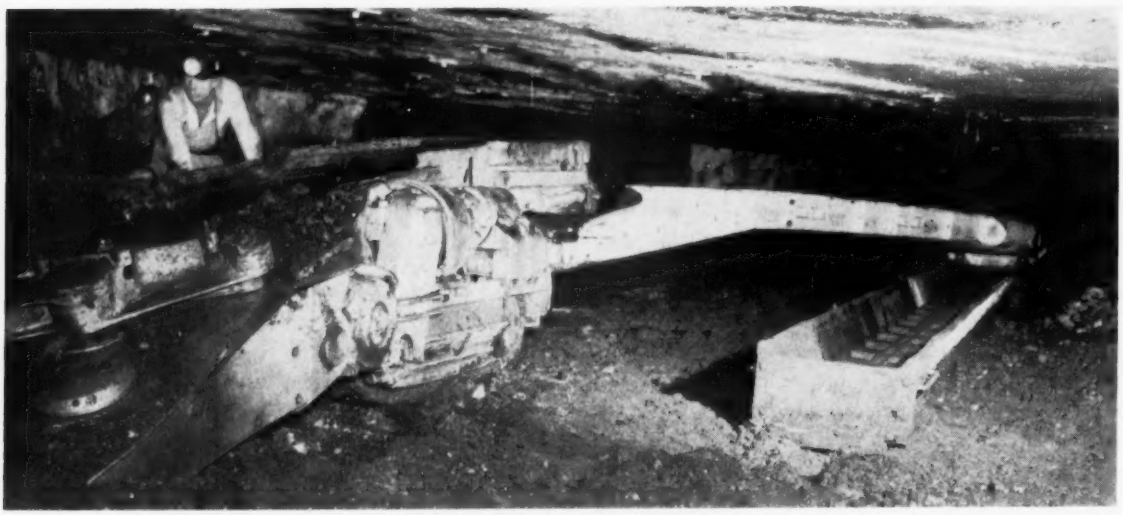
To the roster of those charring or otherwise converting coal for carbon and chemicals, including Union Carbide and Consolidation Coal, has now been added Philadelphia & Reading, U. S. Fuel Co., Peabody Coal-Curtiss-Wright, Food Machinery and American Electric Power-General Electric. AEP and GE are cooperating in a pilot gas-turbine supplement to a steam plant involving charring the coal, burning the gas in the turbine and feeding the turbine exhaust and char to the steam unit. A possible saving of 4% in overall efficiency is the prize. For coal, it would mean an even-more solid position in the utility industry—and possibly an additional competitive weapon in general industry.

Carbon for electric-furnace electrodes, blankets and the like, as well as for iron blast furnaces, is among the objectives of U. S. Fuel, Peabody and Food Machinery, with raw chemicals and process feed stock as by-products. Chemicals are being sought by Philadelphia & Reading, Union Carbide and others, and a combination of chemicals and power-plant char by Consol. Among the by-products and chemicals of practically all the processes are motor fuel and gas or the major ingredients thereof.

The new projects therefore cover the entire spectrum of possible new uses for coal by-products and derivatives, including new types not available from the by-product oven which, up to now, has been the source of most of the coal-based materials for use either directly or as ingredients in more-advanced compounds. And unlike the by-product oven, which is operated to produce coke with other things incidental, at least some of the new processes are operated primarily for the chemicals, thus materially broadening opportunities for coal by freeing it from the coking limitation. Conceivably, this could mean new markets in the millions of tons—perhaps hundreds of millions—if, for example, competitive gas and motor fuel could be produced.

One of the answers is competitive costs. Here coal's advantage grows day by day. Another answer—and a big one—is research and development. The willingness of other industries to expand their work in these directions is one of the most encouraging of the recent developments. Even more significant is coal's strengthening of its own program. Work by other industries and agencies should of course be encouraged, but coal must accept the major responsibility. Only thus can it cash in on its opportunities soonest and to the fullest.

CONTINUOUS MINER is major productive unit in Alabama Power's new No. 7 opening in the America seam. Two machines advance five headings in main entry. Pickup loader and two shuttle cars work with each continuous miner.



LOADER-CONVEYOR TEAM, linked by bridge conveyor, advances three main headings. Combination is especially valuable in soft, wet bottom. Production from the section averages 546 tons of raw coal per shift.

Gorgas Builds for the Future

Alabama Power expands new slope operation with continuous miners and loader-conveyor units, coordinates stripping and augering operations with construction as part of long-range program designed to meet expanding fuel requirements. Positive maintenance program mimimizes delays.

REPLACING OLD OPENINGS that have passed peak production; scheduling strip and auger mining to recover coal that would soon be inaccessible; and preparing for growing demands for coal are major problems demanding long range planning at Alabama Power Co., Gorgas, Ala. Latest results of this planning are the new Lost Creek portal and strip and auger mining in the America and Pratt seams.

The new No. 7 underground operation on Lost Creek is scheduled to produce better than 2,000,000 tons of raw coal per year with a combination of continuous mining and conventional units with bridge conveyors. This projected output will re-

BULLDOZERS cut down major portion of overburden in both strip pits. Highlift shovel with 2½-yd dipper removes lower part of overburden in Busby pit.

HIGHWALL AUGERING with 30-in self-moving unit is third source of coal at Gorgas mine. Four-man crew produces 200 tons per shift.

place tonnage now coming from the No. 4 and No. 6 mines. And there is the possibility of the ultimate output exceeding the projected figure because of increasing demand for more coal-fired power generating capacity.

The New Opening

The America No. 7 portal taps the America seam with two 8x14-ft slopes on the west side of the stream. The belt-haulage slope extends downward at 16 deg and is 285 ft long. The supply slope is 240 ft long.

Alabama Power made plans to sink the two slopes and install complete surface facilities when boreholes indicated less than 50 ft of strata between Lost Creek and the top of the coal. Management decided that the new openings would eliminate the many problems that would be encountered in driving 200 ft or more under the thin cover, as well as offer the advantages of a new mine.

The area blocked out for the portal contains coal ranging from 30 to 60 in thick. Although several partings cut the seam, they do not hamper operation of the ripper-type continuous miners. Boreholes indicate that the thickness of the parting will range from ½ to 13 in. Average reject from other Gorgas openings is 30 to 35% and management expects the same volume from the new opening.

The coal is overlain by shale which requires support either by wood crossbars on 5-ft centers or 30-in bolts. It is underlain by fireclay which disintegrates and becomes soft when in contact with water. To overcome the disadvantage of soft, wet bottom, the company employs Long Piggybacks and chain conveyors with conventional loaders in wet areas.

Continuous Mining Plan

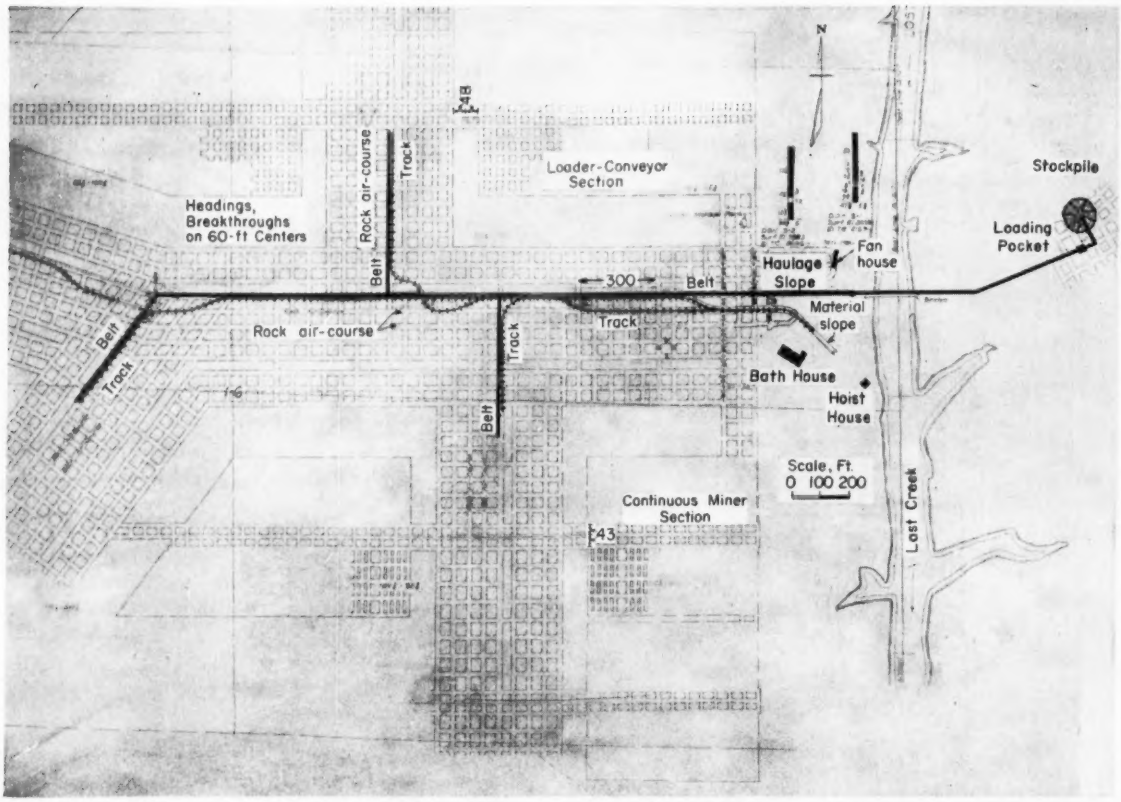
Alabama Power now has two Joy 3JCM continuous-miner units working in the America No. 7 portal. One unit has a 36-in cutting head and the other a 42-in head. These machines team up to advance the middle five headings in the 11-heading main entry. Headings and breakthroughs are cut on 60-ft centers.

Each continuous miner drives two of the outside headings and the center opening is driven by whichever machine is advancing faster. Headings and breakthroughs are cut 16 ft wide, except No. 5 which is driven 24 ft wide to provide room for the main-haulage belt and the supply track. All breakthroughs are cut at right angles to the headings.

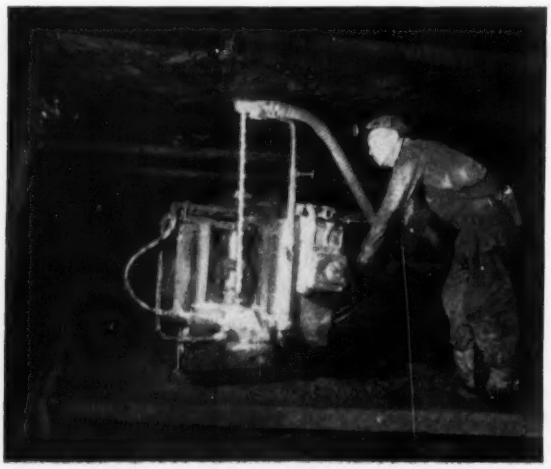
The continuous miners advance each of the five headings 60 ft to the next breakthrough. Then the machine working the left headings cuts a breakthrough from No. 3 to No. 1 and the right unit cuts from No. 5 to No. 3. After advancing 300 ft, the left miner cuts a breakthrough to connect the five continuous-miner headings with the three parallel headings being driven on the left by conventional equipment and Piggybacks.

Other equipment working with each continuous miner includes a 12-BU pickup loader with paddles on the digging arms to speed loading of fines, Fletcher roof bolter, two 6SC shuttle cars and either a Jeffrey or company-made belt feeder. A Jeffrey car is available as a spare.

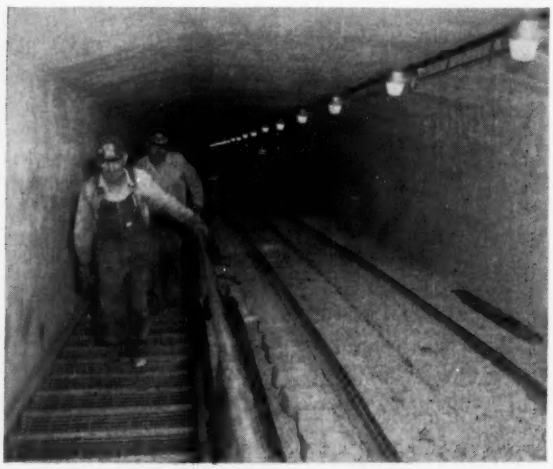
Shuttle cars carry coal from the pickup loader to the feeder at a 30-in belt conveyor that extends across the five continuous-miner headings and the three parallel Piggyback headings on the left. The gathering belt is moved to a new setup after every 300 ft of advance.



DEVELOPMENT PLAN for Lost Creek No. 7 all-belt mine features 11 headings in the mains, nine in the primaries and three in room panels. Supply track is installed in same heading as belt conveyors in main entries.



ROOF SUPPORT rates top consideration at Gorgas mine. Temporary crossbars on steel jacks are replaced by roof bolts.



SUPPLY SLOPE has 186-W lights on 10-ft centers. Haulage slope houses 48-in belt and will soon have man belt.

As the continuous miner advances, the operator's helper installs 3x8-in by 16-ft temporary crossbars on 5-ft centers with Simplex jacks. Each section is supplied with 120 crossbars. As soon as the machine goes to a new place, the bolter moves in and installs 30-in expansion-shell-type high-tensile bolts. Bolts are installed in headings and aircourses but not in rooms driven with continuous miners.

Bolting standards require two bolts per row in 16-ft places, three bolts per row in 18-ft places and five bolts per row in the 24-ft double heading. Rows are spaced 5 ft apart and the first bolt in a row is never placed more than 5½ ft from the rib.

Each continuous miner crew includes a miner operator, miner help-

er, pickup-loader operator, roof-bolter, two shuttle-car drivers, utility man, belt-cleanup man and foreman; total, 9. Production averages 560 tons of raw coal per shift.

Loader-Conveyor Mining

To overcome the disadvantages of wet, soft bottom, Alabama Power has available a number of loader-conveyor units. One of these units is now working three headings alongside the two continuous miners in developing the new America No. 7 main entry.

Equipment includes a Joy 14-BU loader, 11-RU cutter, Fletcher roof-bolter, three Long Piggybacks and chain conveyors, and a Kersey battery-powered supply car.

The crew is made up of a loader operator, cutter operator, cutter helper, roof-bolter, supply man, two panmen and a foreman; total, 8. Production from the section averages 546 tons of raw coal per shift. Although it takes more time to move the conveyors to a new cross-conveyor site, management notes that the freedom from delays resulting from wet conditions more than offsets the additional time spent in moving.

The loading machine discharges coal to a Long Piggyback which carries it to a Long chain conveyor. Each of the three headings has its own chain and Piggyback. The loader, cutter and roof-bolter travel from place to place. The chain conveyors discharge to the cross conveyor, which also receives coal from the continuous miners.

Transporting the Coal

Coal from the three producing sections in the No. 7 opening feeds to a 30-in Transall gathering belt which carries it to the main gathering belt. The main conveyor is now a 36-in Transall belt but will be replaced by a 42-in unit when the mine expands. Coal on the main belt flows to the foot of the haulage slope where it discharges onto the 42-in Goodyear neoprene belt on a 48-in Continental Gin frame.

After reaching the surface the slope belt continues horizontally across a bridge spanning Lost Creek and terminates at a transfer station on the east bank. Coal then flows to a surface conveyor that elevates it to a two-way discharge chute where it may be directed either to an underground loading pocket in the No. 6 mine or to a surface stockpiling area.

Coal in the loading pocket feeds to a car-loading station in the No. 4 mine and then is hauled in mine cars to the Gorgas preparation plant. If the loading pocket and surface area surrounding it become filled, coal is diverted to a chute feeding a Barber-Greene stacker. A bulldozer pushes the stored coal to the loading pocket as needed to keep coal flowing to the mine cars.

Surface Facilities

New facilities at the No. 7 portal include a 40x100-ft prefabricated steel building which houses the shop, supply room, supervisors' offices, and bathhouse; a 32x40-ft supply shed; 16x24-ft oil house; and a 25x28-ft hoist house. The bathhouse is designed to handle up to 500 men. By Jan. 1, 1960, the company expects to have a 24-in mantrip belt installed in the haulage slope to transport workers in and out of the mine.

Yard lighting is provided by 1,000-W mercury arc lights strategically mounted high on 10 poles. Additional lighting is provided along the outdoor belt conveyor by 186-W incandescent lamps mounted 18 ft above the ground on poles 20 ft apart. Both the slopes are lighted by 186-W incandescent lamps mounted 10 ft apart along the roof.

The Power System

Primary power is metered at 44 KV and then is delivered to two, 1,000-kva transformers that reduce it to 4.2 KV. It travels on the surface by pole line to mine conversion units feeding underground DC equipment. Gorgas has 13 conversion units, with a total capacity of 3,900 kw, feeding DC power to the various openings. The new No. 7 portal receives power from two Westinghouse 500-kw rotary converters. Voltage at the conversion units ranges from 300 to 315 and average voltage at the face is 290.

Power from the No. 7 converters enters the mine through boreholes which intersect the coal seam in the aircourse adjacent to the main belt heading. At the bottom of each borehole is a 2,000-amp cutout switch. Power is carried to the working areas by 1,000,000-cir mil positive and negative feeders.

As No. 7 mine expands, primary mains will be driven from the mains. These entries will have room panels running right and left to a depth of 2,000 ft. No more than four room panels will be worked from any one substation setup. And average maximum distance from the substation to the face will not exceed 2,500 ft. By using this system the company will eliminate the need for an automatic-reclosing circuit breaker at each panel because the substation's automatic unit will be able to handle the job.

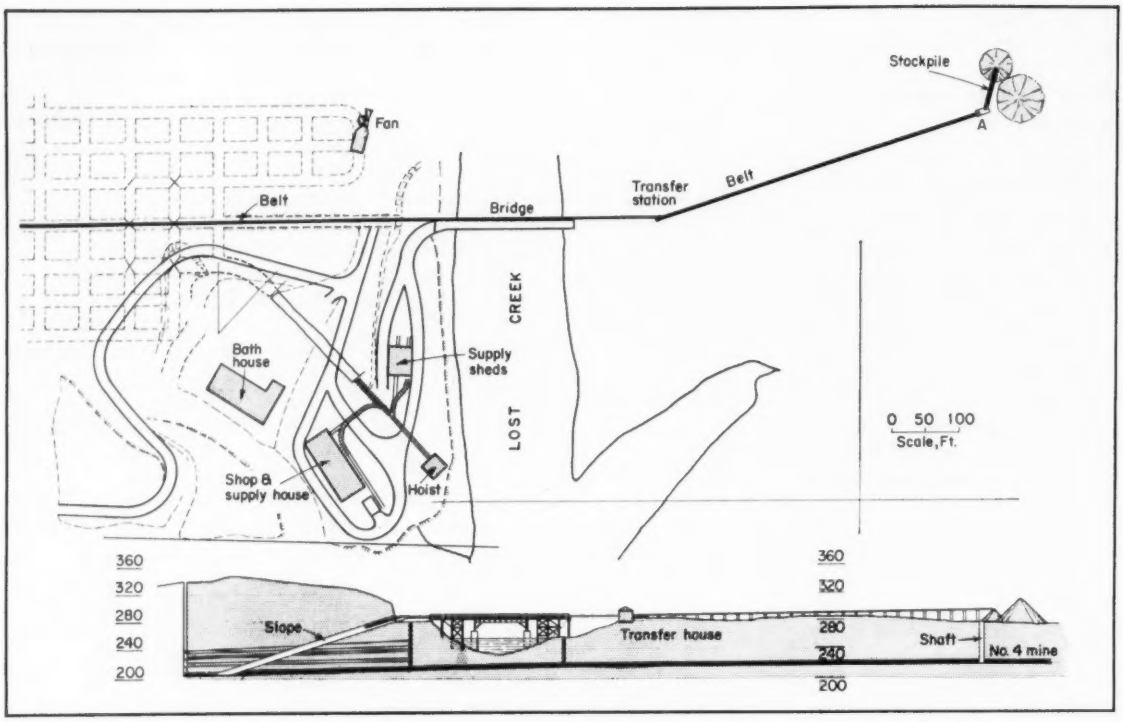
The No. 7 mine is laid out for all-belt haulage with 440-V AC drives on all main belts and 275-V DC drives on panel conveyors. Transmission lines for AC drives will be carried on the surface over the main entries to boreholes leading to the drives.

Fully automatic controls are planned for the belt network, including sequence starting, overload, slippage and pileup protection. If any protective device stops the belts, a special indication unit designed to Gorgas specifications by Ensign Electric shows which protective device stopped the unit. This feature is designed to help maintenance men find the trouble quicker. Schroeder pullcord stop-start switches extend along belts as an added safety feature. These switches make it possible to stop and restart the belts from any point along the pullcord.

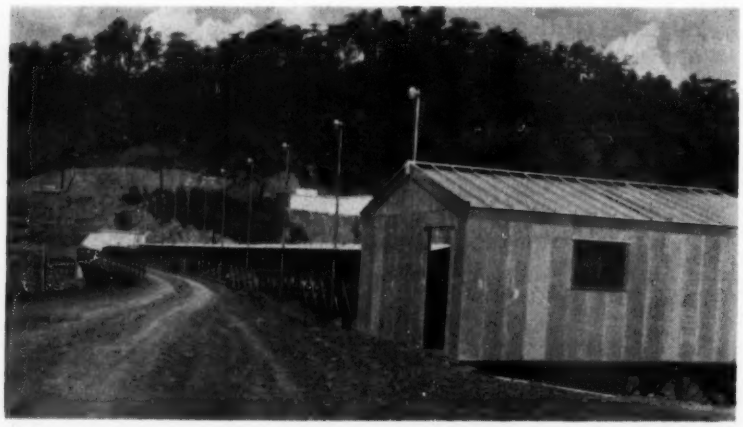
Stripping and Augering

Recovering coal that would become inaccessible because of new plant construction or the need for new settling ponds is another important job demanding long-range planning at Alabama Power. Engineers estimate that the company has available within 7 mi of the Gorgas preparation plant 16,000,000 tons of strip coal and 1,000,000 tons of sugar coal. These reserves are in the America and Pratt seams.

To insure recovery of strip and auger coal well ahead of the time certain areas would be needed for new construction, Alabama Power leased outcrop areas to the McCoy Coal Co. and the J. H. Busby Coal Co. in 1957.



SURFACE LAYOUT includes shop and supply houses near material slope, bridge spanning creek and conveyors.



BRIDGE spanning Lost Creek supports horizontal portion of slope belt. Drive is housed in prefabricated metal building.

Stripping Pratt Coal

McCoy Coal Co. strips the Pratt seam which has a thickness ranging from 28 to 36 in. Employing big, powerful bulldozers as major units, McCoy now works to banks up to 50 ft high. In reaching the 50-ft bank as many as six cuts are taken parallel to the outcrop.

Either an International TD24 or a Caterpillar D9 cuts a drill road at the edge of the cut as the first step in preparing the overburden. Then a Reich 750 drill moves in and sinks 9-in holes on 16-ft centers in the middle of the road. Holes are drilled to the coal and then backfilled 2 ft.

Two men on a single-shift basis handle the drilling job. They sink an average of 600 to 700 ft of hole per day. On alternate days the crew helps the shooter charge holes with ammonium nitrate-oil mixture near the end of the shift.

While the drill crew sinks holes the shooter distributes 50-lb bags of Spencer N-IV uncoated prills to the drill holes. He then pours 2 qt of No. 2 fuel oil into each bag of prills and lets the mixture soak for a minimum of 30 min. When the mixture is ready for charging the drill crew helps him fill the holes.

McCoy Coal uses 6 to 8 ft of 150-grain Primacord as a primer in each hole. This fuse is tied to 50-grain Primacord which is used in the remainder of each hole and to connect all holes. The company's goal is to break 2 to 3 cu yd of bank per pound of explosive. To maintain this ratio, 100 to 250 lb of nitrate-oil mixture is used in each hole.

In many cuts following the initial cut, two rows of blastholes are required to get the fragmentation desired for good bulldozer stripping. When this procedure is followed drill roads are cut on two levels 10 to 12 ft apart. A 9-MS delay is used between the two rows of holes. The company also tries to use explosives effectively to throw as much of the overburden as possible into the pit where it will not have to be handled by the stripping machines.

Deck loading is practiced when drillholes are 45 to 50 ft deep. Three

50-lb bags of nitrate-oil mixture are poured on top of the backfill, 8 ft of stemming is added, then two 50-lb bags of the explosive are poured in. The 150-grain primer extends through both decks. Stemming is carried to the top of the hole.

The two bulldozers work as a team as much as possibe while cutting down 40 to 50% of the shot bank. Other jobs for dozers include cutting drill roads, building haulage roads and cleaning pits for auger mining. The dozers work only one shift.

A Lima 2400 shovel with a 60-ft boom and 4½-yd dipper on a 45-ft stick works two shifts per day removing the lower portion of the overburden. This machine is powered by a Caterpillar turbocharged 550-hp diesel engine and has a National torque converter.

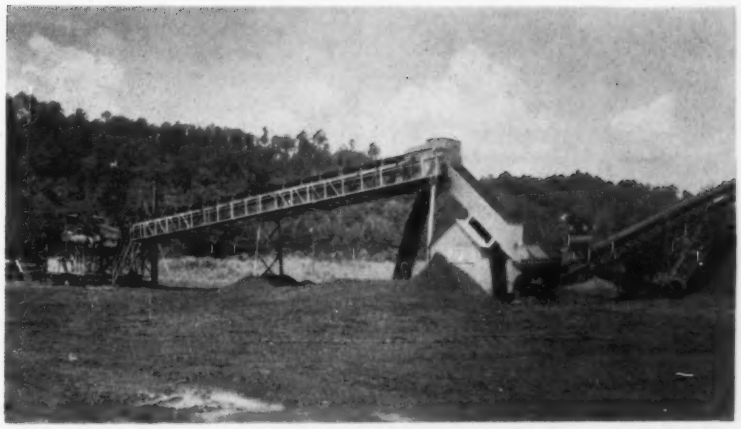
Coal is loaded on only one shift at the McCoy stripping. A Caterpillar No. 12 road patrol scrapes loose, fine dirt from the coal before a Lima 703 shovel with a 2½-yd coal dipper moves in. The coal shovel is powered by a 200-hp Cummins diesel engine transmitting power through a Clark-Torcon torque converter.

A fleet of four trucks carry coal 3½ mi to the Gorgas preparation plant. The fleet includes two 22-ton International 210's powered by 200-hp Cummins diesel engines; one 25-ton Mack powered by a Cummins 250-hp turbocharged diesel engine; and a 22-ton Ford 900.

McCoy Augering

After strip mining reaches the 50-ft highwall a Salem 30-in self-moving auger is brought in to recover another 125 ft of coal in solid areas or to cut through to old mine workings. When recoverable coal remains beyond the 125-ft limit barrier pillars are left along the highwall to provide future access to the area. The distance between auger holes varies with the type and strength of overburden, but usually is 10 to 12 in.

A crew of four men produces 140 to 150 tons of clean auger coal per shift. Three men remain with the auger and the fourth man drives loaded trucks to the preparation plant. Two White 12-ton trucks are used alternately to haul the auger coal. One truck serves as a surge bin while the driver makes a round trip to the plant with the other.



ALTERNATE ROUTES for coal carried by surface belt are loading pocket leading to No. 4 mine, shown receiving coal, or stockpile conveyor at right.

Busby Stripping

J. H. Busby also relies on big bulldozers to move a major portion of the overburden, teaming a Caterpillar D9 with an International TD24 to handle 60 to 65% of the material. A Koehring 1005 high-lift with a 2½-yd dipper removes the remainder. Mining is in the Pratt and America seams.

Average stripping ratio in the Busby pit is 12 to 1. When coal thickness decreases to 24 in mining stops at the 40-ft highwall. Stripping machines work two shifts but sometimes operate around the clock when unusually hard overburden is encountered.

Overburden consists mostly of firm shale and shale intermixed with sandstone. Because of its hard nature all overburden is broken with explosives. Busby employs a Reich vertical rotary dry-type unit with a 35-ft drill stem to sink holes for ammonium nitrate-oil blasting agent. Two men operate the drill one shift per day and are able to keep pace with the stripping units.

If coal thickness is 30 in or more two rows of 9-in blastholes on 16-ft centers are drilled. But if seam thickness is less than 30 in only one row of holes is bored. In two-level drilling, roads are cut horizontally around the hillside at levels 7 to 10 ft apart. Either of the stripping bulldozers cuts the drill roads.

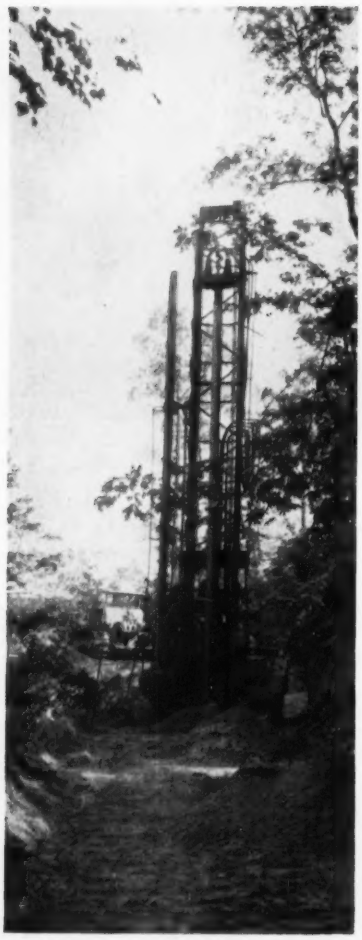
Holes are charged with ammonium nitrate-oil mixture and detonated each day. One man delivers 50-lb bags of ammonium nitrate to the drilling site toward the end of the shift. After distributing the bagged material he pours 2 qt of fuel oil into each bag. Then after the mixture stands for 30 min the two drillers join the shooter and help charge holes.

Each hole is primed with a section of 150-grain Primacord which extends the full length of the charge. The primers connect to 50-grain detonating fuse which connects all holes. If the rock is hard a 9-MS delay connector is used between the two rows of holes. When water seeps into the holes the Busby operation switches to Austin ammonium-nitrate cartridges with built-in primers which are water-resistant.

After the shovel reaches the top of the coal a road patrol scrapes off loose, fine material. Then, to simplify and speed coal loading, a bulldozer pushes the thin seam into a pile. A 1¾-yd Lima 604, powered by a Cummins 200-hp diesel engine, transfers coal from the pile to a fleet of five trucks. Included in the fleet are two 24-ton Whites, two 24-ton Ford F8's and one 14-ton GMC. These units haul an average of 700 tons per shift a distance of 4½ to 7 mi to the Gorgas preparation plant.

Busby Augering

Busby Coal Co. also supplements its stripping production with auger mining, employing a Salem 1400 self-moving machine to bore 30-in holes. A four-man crew drills an average of 1,000 ft of auger hole per day in the Pratt seam, which yields 200 tons of coal. Coal is transported to the preparation plant by two Ford F900



VERTICAL rotary overburden drill sinks 9-in blastholes at two strip pits.

SECOND STRIP PIT has a 4½-yd diesel-powered shovel with 60-ft boom for handling the lower part of overburden. Final bank is 50 ft high.

FASTER LOADING of thin seam is achieved by piling up coal with bulldozer. Loading shovel makes a minimum of non-productive moves.

trucks that carry a 24-ton payload.

Three of the men handle all duties connected with moving, setting and drilling. The fourth man drives loaded trucks to the preparation plant. A portable Haiss elevating conveyor transfers the coal from the mouth of the hole to the waiting truck. Since it takes less time to make a round trip to the plant than it does to fill a truck with augered coal, the second truck serves as a surge bin.

Because the friable material covering the Pratt seam tends to break with little warning posts are set in the mouth of each hole as soon as drilling is completed. These timbers are watched closely to detect any subsidence which might cause a highwall slide and ensuing injury to the crew or damage to the auger.

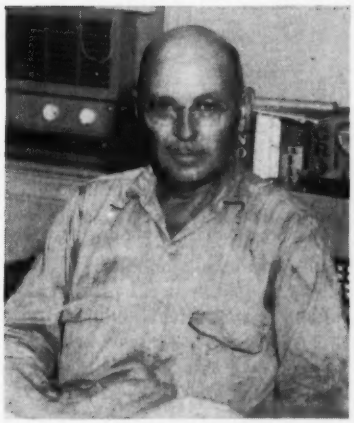
In drilling the Pratt coal, Busby leaves 12 to 15 in of solid coal between holes. This pillar is reduced to 8 to 10 in when the America seam is augered.

Maintaining the Equipment

Regular rebuilding of all major mining equipment plus unit assembly replacement on the non-producing third shift are two ways that Alabama Power employs to keep production delays to a minimum. One outstanding result of the continuing campaign to increase productive time is the reduction of total delay to less than 10% of total available work time. While stressing regular rebuilding and unit changeout in its maintenance program, Alabama Power also relies on production-shift maintenance men to spot potential trouble before it develops into serious trouble.

The Gorgas maintenance program is under the direction of W. H. Cornelius, chief electrician. Assisting him and directly responsible for all underground maintenance are Paul Hooker and Earl Oliver, assistant chief electricians.

Eight maintenance foremen oversee and organize the day-to-day activities of 92 maintenance employees. Four of the foremen and 36 maintenance men report on the third shift to perform repair jobs that cannot be done without causing a serious delay on a production shift. A major portion of their work consists of exchanging any unit assembly that is spotted as defective by a section mechanic on the production shifts. Another important function of the third-shift is to rewire electrical circuits which are causing trouble in machines not ready for a complete scheduled overhaul. A third impor-



MAINTENANCE is headed by W. H. Cornelius, chief electrician.

PRODUCTION supervisors include J. L. Coleman (left), underground superintendent; J. H. Harsany, stripping superintendent; and D. L. Boggs, mine foreman.

Gorgas Mine Rebuilding Schedule

Type Machine	No. of Machines	Period Between Overhauls	Machine Rebuild Schedule, One Every	Manshifts per Rebuild
Continuous Miner 11RU	7,1 spare	1 yr	30 days	70
Cutter 14BU	7,1 spare	1 yr	40 days	30
Loader 12BU	9	1 yr	40 days	45
Loader	8	2 yr	60 days	45
Shuttle Cars	28	2 yr	15 days	45
Bolters	9	1 yr	30 days	20
Locomotives	16	2 yr	As needed	20

tant job for third-shift maintenance men is lubrication of all face equipment.

Handling Lubricants

Hydraulic oil is purchased in bulk lots and stored on the surface in a 10,000-gal tank. The daily supply for face equipment is pumped into 14-gal steel drums which are sealed with a cap. The sealed containers are hauled to each section and placed on a rack which can hold four of the 14-gal drums. Section mechanics draw oil out through a ¾-in valve and fill 5-gal pump-type dispensers which are used to fill hydraulic-oil reservoirs on face equipment.

Fluid-type grease is purchased in 14-gal drums and taken directly to the section storage rack. Section mechanics transfer this lubricant to a high-pressure gun for serving face units. Bearing grease is dispensed with a hand gun.

Production-Shift Maintenance

Underground maintenance men on each of the two producing shifts—one foreman and 14 repairmen on each shift—make minor repairs and lubricate the continuous miners. They also observe each piece of equipment in operation to detect potential trouble. If one of these men discovers a weakness and feels that the machine will be unable to continue running through the two production shifts, he calls for the electrical foreman. If, on checking the machine, the foreman concurs, the unit is repaired between shifts so that no production is lost.

Each section has its own supply station which is stocked with small, fast-moving items that are often needed during the production shift. Among the important items kept on hand are mercury tubes, coils, contactors, hydraulic hoses, conveyor chain, links, spare tires and head lamps.

Unit Rebuilding

Unit replacements, such as wheel units, electric motors and shuttle car panelboards, are rebuilt by specialists who work in special unit-assembly centers. This work takes place in two buildings, one 60x60 ft and the other 14x14 ft. Ten men work in the larger building and two in the smaller. Work assignments for men in the larger building are as follows:

1—Conveyors for continuous miners or loaders.

1—Wheel units and gear pots.

2—Electric motors and gear reducers.

1—Hydraulic pumps and motors.

1—Hydraulic jacks, swing sheaves, duster bags.

2—Machinists.

1—Continuous-miner heads.

1—Buildup of worn shafts and sheaves.

Activities handled by two men in the 14x14-ft center include rebuilding panelboards, repairing contactors, building resistor assemblies, rewinding coils and repairing phones.

All rebuilt unit assemblies are tagged and stored in the warehouse. Parts and labor required to rebuild the unit are charged to the section from which the assembly came. When a rebuilt assembly is taken from the warehouse, the supply clerk notes which machine it will be used on.

Every 3 mo the supply clerks add up the number of unit assemblies, noting where each was used. If any particular machine shows more than average usage the company investigates the mining conditions. If these conditions are found normal, the main-

The Company that cares enough to give you the best!

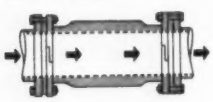
Massco-Grigsby

PINCH VALVES

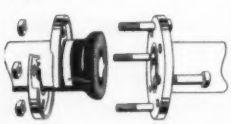
RUBBER, NEOPRENE
for Corrosion and Abrasion

- 1" to 14" inside diameter.
- Pressures to 150 psi.
- Temperatures to 200° F.
- Patented "hinged" sleeve. Recesses serve as "hinges" during compression; reduce strain and permit tight closing.

- Cannot leak or stick.
- No working parts in contact with pulp or liquid; no packing glands.



- Unobstructed flow eliminates high friction loss.
- Remote control available.
- Can be equipped for automatic regulation.



- Split flanges and patented Flex Seal ends assure perfect seal.
- Closing mechanisms... manual handwheel; handwheel with chain and sprocket reduction unit; electric worm gear motor reducer; chain operated torque arm reducer; hydraulic; air-hydraulic.

WRITE FOR NEW CATALOG...

Manufacturing Division

MINE AND SMELTER SUPPLY CO.

3800 RACE STREET • DENVER, COLORADO
OFFICES AND AGENTS IN PRINCIPAL CITIES

tenance superintendent goes to the shop and checks the method of repairing and inspection and makes any necessary changes.

Major Overhauls

Repair specialists work in a 30x90-ft building which is divided in separate areas for overhauling each type of machine. It also has two pits which may be used to work on a continuous miner or a locomotive. Four overhead traveling cranes make it possible to move heavy parts quickly anywhere about the shop.

To help management analyze equipment performance, the maintenance department keeps accurate daily delay records. These records enable mine management to tell at a glance what the delays were for each section and the total for the mine. Monthly summaries of delay time indicate the trend for the year.

Maintenance Training

To upgrade the skills of maintenance men, Alabama Power started a training program several years ago. The purpose of the course was to train the men in subjects which would enable them to more ably handle the new problems arising with today's mining equipment. Mechanization at Gorgas had grown at a faster pace than the skills of the maintenance men; consequently, management decided to set up in-company training as the fastest method to improve maintenance.

The course included a thorough foundation in the fundamentals of electricity and hydraulics, followed by application of these principles to solve typical troubles on equipment.

Classes were set up for all three shifts with Earl Oliver, electrical foreman; John Perry, electrician; and Carl Kindrick, electrician, each teaching a class. These men set a teaching pace that assured students a thorough foundation in the fundamentals before moving ahead. Classes lasted 2 hr and met each week for 2 yr.

After mastering the fundamentals, the class took up various units in use at Gorgas mine. For example, starting boxes, motors, panelboards, hydraulic pumps and the like were used in classroom instruction. Typical troubles were placed on the various units and then the students were trained to systematically find the trouble and correct it. Other classroom work included rewiring completely such items as a starting box, control and motor for a continuous miner.

Training Benefits

Aside from a significant reduction in delay time Alabama Power notes that the maintenance men who took the course call the electrical foreman less frequently for help. They have confidence in their ability to analyze trouble and know how to correct it.

Supervisor Training

To help all supervisors to improve their management skills the company also has sponsored two management training programs. This, too, was a voluntary program and was held for two successive years during the miners' vacation.

The first program included sessions on safety, maintenance and personnel problems. In the safety sessions the men received additional Bureau of Mines training in first aid and studied good accident reporting practices.

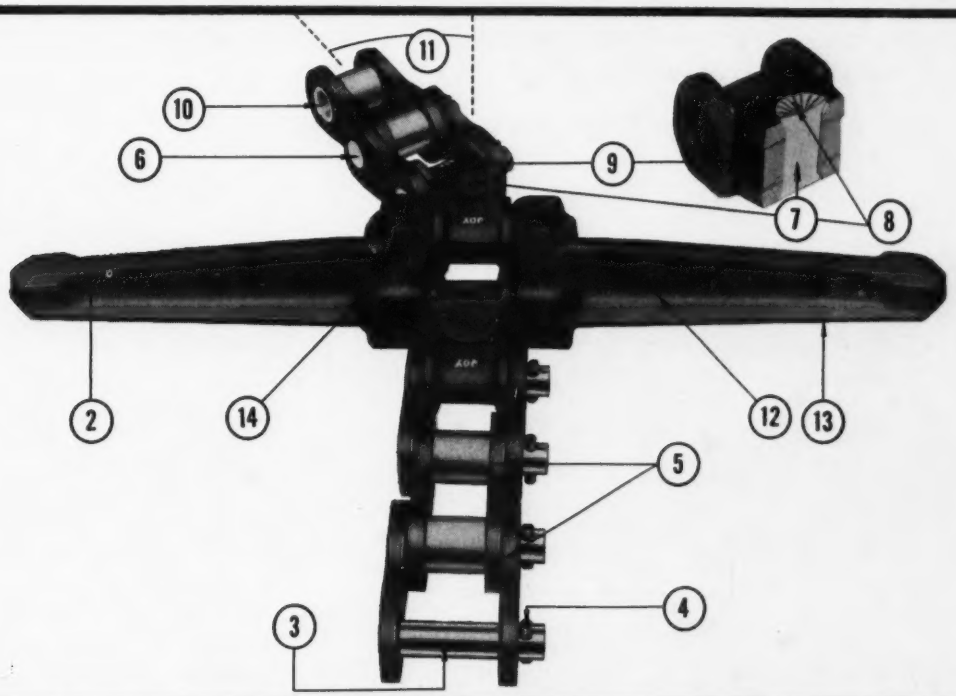
The second part of the first program stressed fundamentals in maintenance that would enable production supervisors to understand the problems of section maintenance. For example, the men studied fundamentals of hydraulics and lubrication, care and use of carbide bits, belt transportation, and care of belts.

While studying personnel problems the men took up such topics as how to get along with people, why people act as they do, and how to manage better.

Success of this initial supervisory training prompted the company to set up a second program for the following year. This second program, too, was designed to sharpen and improve supervisors' skills.

Safety held an important position in the second program with particular emphasis on fires and explosions. Another important phase of the program dealt with personnel problems and was designed to help the man who had recently been elevated to foreman. Major topics included human behavior, labor grievances, production methods, supply costs, good management practices, proper use of belt conveyors, and care and abuse of cables.

30% STRONGER
JOY'S NEW 14-BU CONVEYOR CHAIN
All new 2⅜" pitch chain fits all 24" Conveyor Machines



Your present loaders can be up-dated to give you new dependability with this new chain. It has larger dimensions, different geometry and different materials—different heat-treating techniques. Each of the parts were developed from our experience with the many different chains in our line. The best features of field-proved chains were assembled into this new chain to modernize all 14-BU's and all other 24" conveyor machines to give you new freedom from breakage . . . less downtime than ever before.

Find out for yourself why this new Joy chain is so superior. Study the photo and the features, then call in your Joy engineer. He has complete details.

Only the New Joy 14-BU Conveyor Chain Has All These Outstanding Features:

Strongest Connecting Link on the Market

3. Rugged, large-diameter pins—twice as strong.
4. Large diameter lock pins—twice the size of any former pin in use.
5. Thick side plates—33% stronger.
6. Oversize rivet heads—they can't work loose.

Efficient, Heavy-Duty Universal

7. Large-diameter rivet—15% thicker than ever before.
8. Bigger rivet head—full 3/16" deep
9. Large male tongue—50% thicker than most competitive makes.

New Roller Link

5. Thick side plates—33% stronger.
10. Stud-Bushed Rollers—Thick and Strong.

Generous 34° Swing. (11)

Efficient, Long-Life Flight Design

12. Alloy steel, heat-treated to prevent bending and breaking.
13. Reversible scraper action.
14. Extra strong flight pin; alloy steel, heat-treated and welded with high strength rod.

Optional Models—only chain available in 2 models

Available with (1) straight flight design for maximum conveying ability or (2) low coal model with tapered flights.

Fits 14BU-8, 14BU-9 and 20-BU without change; fits 14BU-3, 14BU-7 and 14BU-7R by simple addition of 2⅜" pitch sprocket.

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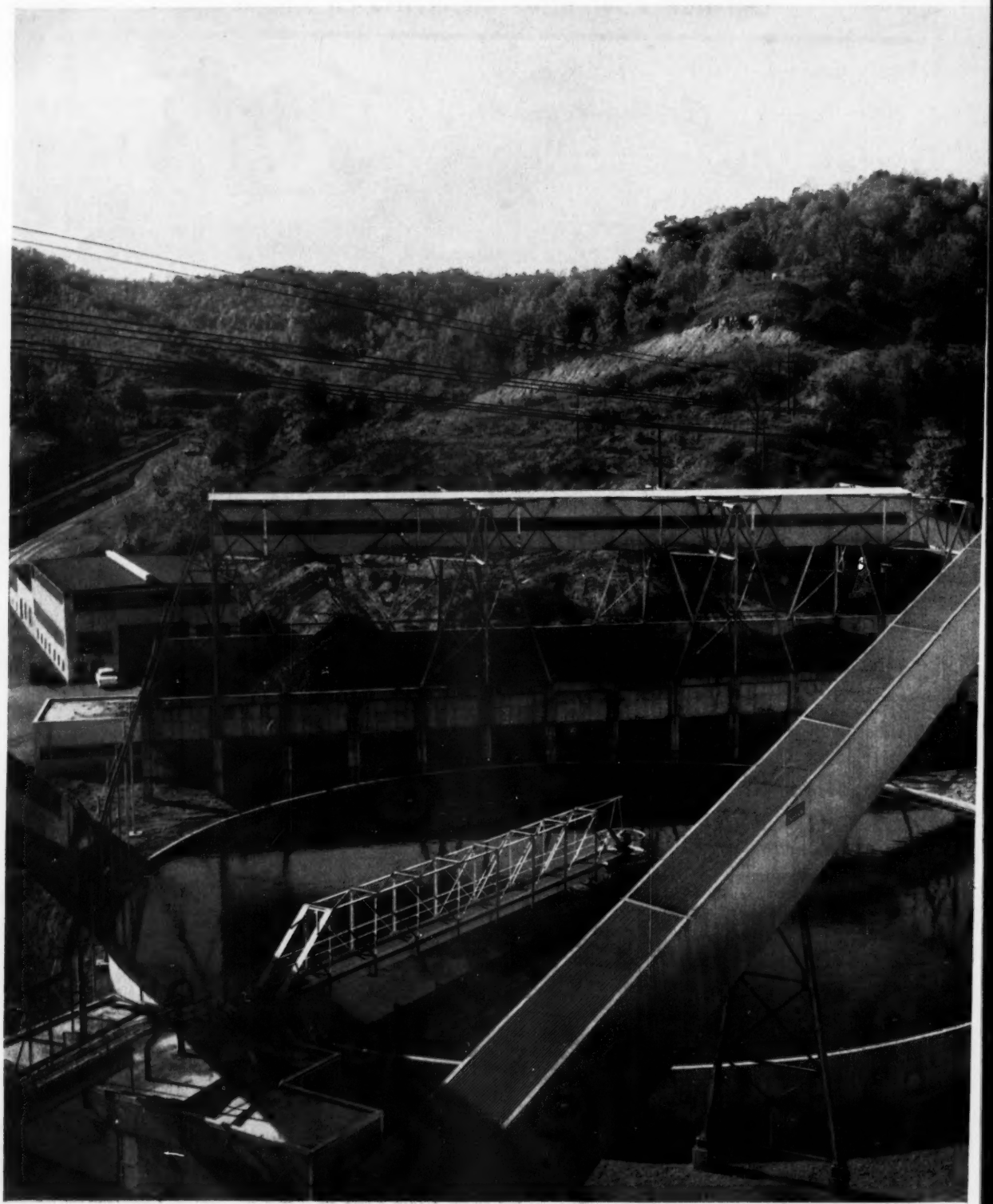
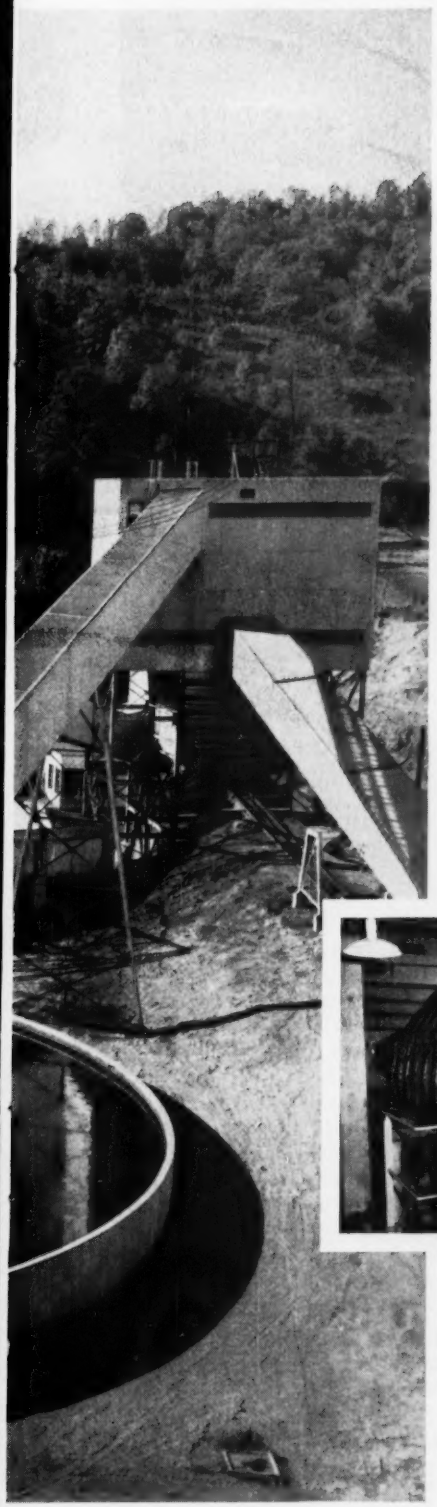
HOW MAJOR EAST COAST MINE HANDLES

The Dorr Type S Thickener is a proven unit now widely used throughout industry.



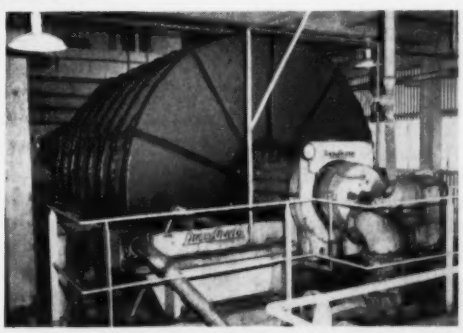
BLACK WATER IN A CLEAN STREAM AREA



Dorr Thickener and two American Disc Filters close preparation plant water circuit

Located in an area free of industrial pollution, preparation plant water handling could have presented a serious problem at this large Northern West Virginia mine. It was imperative that no black water bled back into the creek. The problem was solved – and the water circuit closed – by the use of a 170′ Dorr thickener in conjunction with two 10′6″ dia. by 10 disc American filters.

Primary feed to the thickener is the overflow from the table-refuse drag tank plus other black water. 65 tph makeup water is added at the thickener – approximately the amount evaporated in the heat drying plant, giving a makeup rate of approximately 275 gpm. Overflow is piped to the plant for various uses. Underflow from the thickener goes to the two American Disc filters. Cake from the filters can be sent to the flash dryers or can be diverted to refuse.



American Disc Filter features extremely large filter area for space occupied.

Dorr-Oliver can supply a full range of equipment for coal drying, cleaning, recovery and water clarification. For complete information write Dorr-Oliver Incorporated, Stamford, Connecticut.

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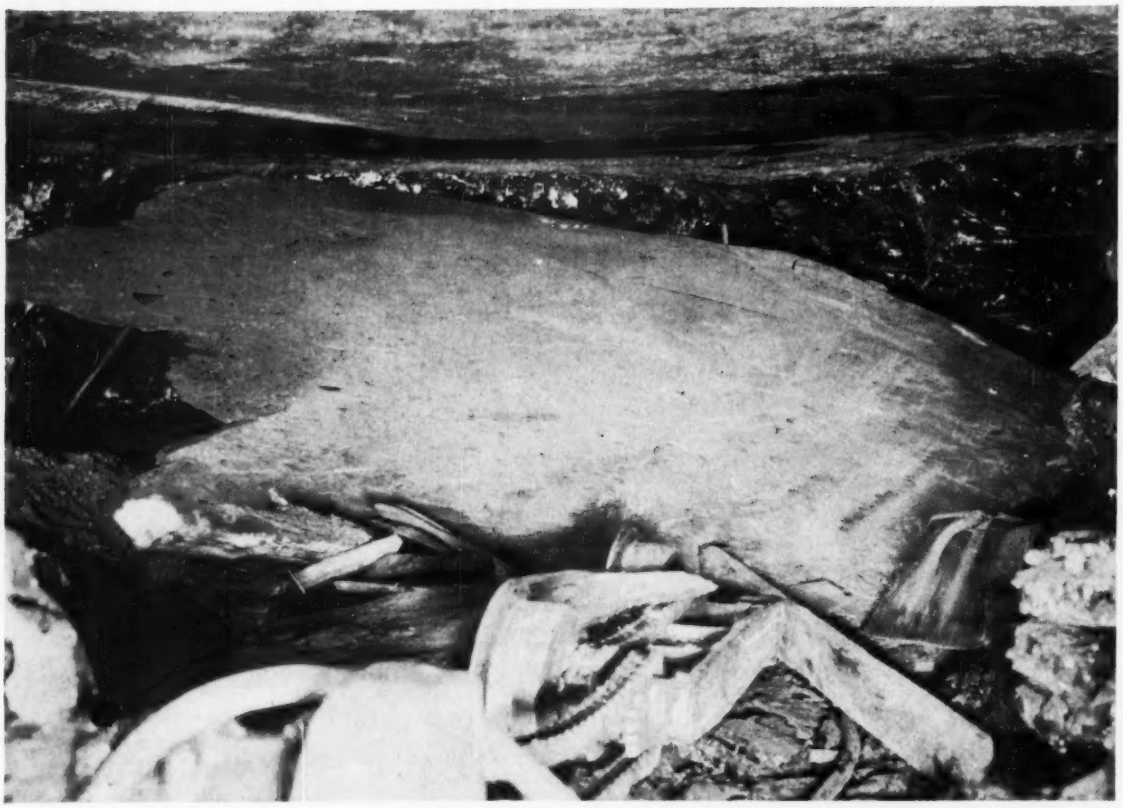

Unless...

What is needed to cut roof-fall accidents.
What is available in methods and materials.
How to go about it.

FALLS OF ROOF AND RIBS in anthracite and bituminous mines in the United States will kill over 150 men in 1960 . . .

UNLESS . . .

All coal-mining companies and all coal-mining men really come to grips with the problem of reducing this hazard to the ultimate minimum.

The ultimate need not be expected in a year. The goal is concrete and meaningful progress. That is the aim of the 1960 roof-fall campaign. Tangible evidences of achievement will go to those who come up with cuts of 50% or more over their record in any one of the three years 1957, 1958 or 1959. It should be possible to do better—and for many operations much, much better. But first it is necessary to decide to make the attempt and enroll in the campaign. Otherwise the chances of progress are slim at best.

Roof-fall accidents, and also rib and face-fall injuries, can be cut, and cut at a reasonable cost, in full confidence that the savings in reduced compensation cost, increased tonnage, decreased destruction of property and increased efficiency will more than offset the necessary additional costs for training, equipment and materials.

Compensation costs eventually are assessed back to the mine either directly or indirectly. Whatever the form they are as real as any other cost, such as, digging out a shuttle car and rebuilding it after it has been covered up. If you translate a $7,500 compensation payment, as an example, into roof-bolt installations at $2.50 each (many are made for much less) you come up with 3,000 that could provide support where it wasn't provided before or, on the other hand, improve the support system already employed.

A plan to go by and machinery for getting the job done are key points in progress. Thus, a blueprint for fall prevention in coal might incorporate five specific objectives:

1. Basic approach.
2. Getting participation.
3. Insuring results through training and conditioning.
4. Maintaining momentum.
5. Providing the support necessary for protection.

BASIC APPROACH: Facts Plus Determination

Most fundamental of all the steps to be taken in attaining the ultimate in fall prevention is a firm resolve to make the effort and unremitting pressure to attain the desired end. Management must initiate the process since without real management backing there is little or no incentive for improvement. Management backing must, of course, include complete willingness to make reasonable expenditures for the necessary training, equipment and materials.

The president must say—and mean it—that accidents must be cut. Then the stage is set.

Facts are the foundation of progress. Basic, of course, is how many roof, face and rib falls have occurred. Even more basic is where and why. The data should cover not only falls that resulted in injury but all falls that could have caused injury or property damage even though they actually did not. This is because any fall is a potential killer or property destroyer and in addition can result in tonnage losses and cleanup costs. If the job of making a record of every fall and its cause is a big one that alone is evidence that something should be done—and promptly.

Keeping down paper work is a highly desirable objective—but not if it forestalls the attainment of a worthwhile aim. A requirement that every fall be reported on, with a statement as to apparent cause and recommendations for preventing a recurrence, will be of major help in any well-rounded program. Where the falls are major, formal investigations, in addition to the regular reports, should be made unless they already are a part of standard procedure. Concrete data on how and why falls occur is the best of all foundations for proper action.

GETTING PARTICIPATION: The Role of the Individual

Whether roof is left up or barred down, whether a post is set or not, whether a bar is removed and not replaced—these and other similar choices are personal decisions on the part of operating supervisors and men. If they are wrong, the result can be a fall and, at the least, some cleanup expense; at the worst death for one—and frequently more—men.

Since individual attitude is so vital in roof-fall accidents—and others as well—major effort must be directed toward getting men—whether supervisors or workers—to accept personal responsibility for the safety of themselves and others. One of the best approaches is to convince them—not only by word but more importantly by deed—that top management means it when it says it wants falls eliminated. After example comes education, persuasion and other approaches including, to the extent necessary, discipline up to and including firing, plus taking the more-recalcitrant ones into court for violation of the mime law.

A real sales job means constant and continuous followup to prevent what otherwise would be the inevitable letdown.

Opportunity . . .

The 1960 National Campaign to Prevent Injuries From Roof Falls in Coal Mines

Eligibility for Participation

All underground coal mines are urged to participate in the campaign. Coal mining companies in Canada and other countries are cordially invited to participate.

Requirements for Participation

The only requirements for participation are:

1. If a company operates two or more mines, each mine must be enrolled separately.

2. Each participant agrees to furnish a simple report of injuries resulting from falls of roof, face and rib for any one of the three years—1959, 1958, 1957—it selects; a report at the end of the first 6 mo of the campaign; and a report covering the last 6 mo.

Awards

The National Safety Council will make the following awards to mines and local unions in recognition of achieving the campaign goal and meeting other requirements at the termination of the campaign:

Certificate of Achievement

1. To mines achieving the campaign goal of a reduction of 50%—or better—in the frequency rate of chargeable injuries from falls of roof, face and rib during the campaign year in comparison with the average frequency rate for their base year, or,

2. Achieving a perfect record of no chargeable roof, face or rib injuries during the campaign year, and,

3. Conducting a minimum of six safety activities during the campaign year directed at the prevention of this type of accident.

Certificate of Commendation for Supervisors

The certificate of commendation will be awarded to each supervisor providing:

1. That all personnel under his supervision have gone through the campaign year without a chargeable injury from a fall of roof, face, or rib, and,

2. That the supervisor has contacted each of his men monthly on some aspect of avoiding injury from a roof fall.

A certificate will be awarded to any supervisor who qualifies regardless of whether or not the mine where he is employed wins the Certificate of Achievement.

Certificate of Meritorious Service (similar to the Achievement award) will be awarded to each local union:

1. Providing the mine(s) in which its members are employed meet the campaign goal, as specified for the Certificate of Achievement, and,

2. The local Safety Committee carries on at least six activities directed at the prevention of roof, face and rib falls, such as, calling attention of fellow members to safe practices and procedures for preventing these accidents on the job, informing its members about the campaign, keeping the campaign regularly before the members throughout the campaign year at its meetings, distributing hard-hat stickers to its members, etc.

Certificate of Commendation will be given to the local union Safety Committeemen providing the local union wins the Certificate of Meritorious Service.

INSURING RESULTS: Training And Conditioning

Among the keys to improvement in the fall accident rate are:

1. Ability to recognize hazards.
2. Automatic action to eliminate.

Training and conditioning are the answers. Men should be taught how to check roof so that they really know its condition, and should be persuaded, forced or otherwise impelled to do checking regularly and automatically. This applies to supervisors, no matter what their rank, as well as men. Proper testing equipment should be provided and stringent rules on checking and testing should be adopted and enforced to the hilt.

But checking roof, face and ribs is only the minor part of the job. The next step is to take action. If safe to do so, the hazardous material should be taken down or supported. If not safe, the approaches should be made safe and then the appropriate action should be taken. The vital thing is to condition men so that this ultimate step is taken automatically. The burden of this conditioning is on management, and is perhaps the biggest of all its tasks in cutting accidents from falls. As long as men hesitate, put off or take a chance, accidents will continue to occur. Action to take down or support material must be immediate and automatic—no argument or delay.

MAINTAINING MOMENTUM: Keeping Interest From Flagging

Since, as previously noted, the interest and participation of each individual is vital to results in this field, as in other safety areas, the program must provide for keeping management, supervisors and men constantly on their toes. It is one of the hardest of all jobs, but a job that must be done if sound and lasting results are to be achieved. Otherwise, the initial steam is soon dissipated and no gains are made.

Here also management and supervision is the primary key. When it continues to talk and act the same after 6 mo or a year as it did when the program was initiated the inevitable effect is to remind employees and keep them on their toes. New posters, letters from the president, a contest with a prize from time to time are among the many methods of keeping men aware of the fact that there is a job to be done—for their own personal benefit as well as for the protection of their employees.

Constant publicity and pressure therefore must accompany all the other steps for the maximum in success in eliminating fall accidents.

SUPPORT: Effective Methods, Materials and Equipment

When all is said and done support is the big item in preventing falls. And if falls are prevented injuries and fatalities also are prevented.

Theoretically—and perhaps practically too—some roofs should not need support. One of the troubles with this idea is the difficulty of seeing under the surface to determine positively that the top is good. A second is the fact that weight, shifting of the strata, etc., can convert a sound top into a hazardous one. For these and other reasons, the rule is: Better to err on the side of having support even though it may not be needed, rather than take a chance on not having it if it should be required, thus setting up the conditions for an injury or fatality.

For bituminous (substantially similar standards apply to anthracite) the basic requirements are set out in the Federal Mine Safety Code, as follows:

"**Sec. 1. Support Standards.—a.** Adequate minimum standards for roof support suitable to the roof conditions and mining system of each mine shall be adopted and followed. Such standards shall show the minimum number and the location of supports, such as, posts, crossbars or bolts, that shall be installed.

"**b.** Before roof bolting is adopted instead of conventional timbering as a sole means of support, its effectiveness shall be proved by experimental installations made in rooms or back entries where there is likely to be little travel after completion. Such experimental installations of bolts shall be accompanied by adequate conventional timbering. After such experimental area has been abandoned for regular travel, the timbers may be removed and the effectiveness of the bolts observed over a period of 2 mo. On the basis of these observations, the minimum systematic support standards shall be determined.

"**Sec. 2. Support Supplies and Methods.—a.** The management shall provide at or near the face workings an ample supply of suitable materials of proper size with which to secure all working places in a safe manner.

"**b.** Safety posts, jacks or temporary crossbars shall be set close to the face when necessary for safety before other operations are begun and as needed thereafter.

"**c.** Roof shall be adequately supported to protect the workmen when roof material is being taken down, crossbars are being installed, roof-bolt holes are being drilled, and when roof bolts are being installed.

"**d.** The roof in all underground working places, unless self-supporting, shall be secured sufficiently to protect employees from falls of roof, face or rib. Loose roof and overhanging or loose faces and ribs therein shall be taken down or supported.

"**e, or Sec. 209 (c)—Title II.—** The roof and ribs of all active underground roadways and travelways in a mine shall be adequately supported to protect persons from falls of roof or ribs.

"**f.** Supports knocked out accidentally shall be replaced promptly.

"**g.** Permanent supports in active workings shall not be removed unless equivalent protection is provided.

"**h.** Where roof supports are required at the working faces, persons shall not advance beyond artifically supported roof, except those who are assigned to install supports or inspect the place.

"**Sec. 3. Testing of Roof, Face, Ribs, and Roof Bolts.—a.** The management shall instruct all underground workmen in the proper testing of roof, face and ribs.

"**b.** Persons exposed to danger from falls of roof, face, and ribs shall examine and test the roof, face and ribs before starting work or before starting a machine and frequently thereafter. When dangerous conditions are found, they shall be corrected immediately before work is continued or any other work is done, or the place shall be vacated.

1. Steam hammer forges a heated blank to general contours of a Bethlehem Mine Car Wheel. Next, forging flash is cut off in trimming press, and hole is punched through hub.

2. This boring mill, first of several in production line, trims the flange, rough-bores the wheel, faces the back-hub. Wheel is then reversed and the front hub is faced.

3. After bearing seats are rough-, semi-, and finish-bored, this 4-spindle multiple drilling machine drills and taps for grease fitting, as well as for hub cap holes.

4. Final step in production of Bethlehem Mine Car Wheels is the inspection of finished wheel. Every Bethlehem mine car wheel receives the same rigid inspection.

Making the best mine car wheel of them all

Over the years, thousands of heavily-laden trips have proved the dependability and long-range economy of Bethlehem Forged-Steel Mine Car Wheels. Not one of these wheels has ever been reported to have suffered a broken flange, or failure of any kind.

Made by the most modern methods, with the most modern equipment, Bethlehem wheels have great strength, toughness and resilience, and are suitable for any speeds, or operating conditions. All wheels are furnished machined, ready for installation. For further particulars, write to our nearest district office for Folder 716, "Bethlehem Forged-Steel Mine Car Wheels."

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

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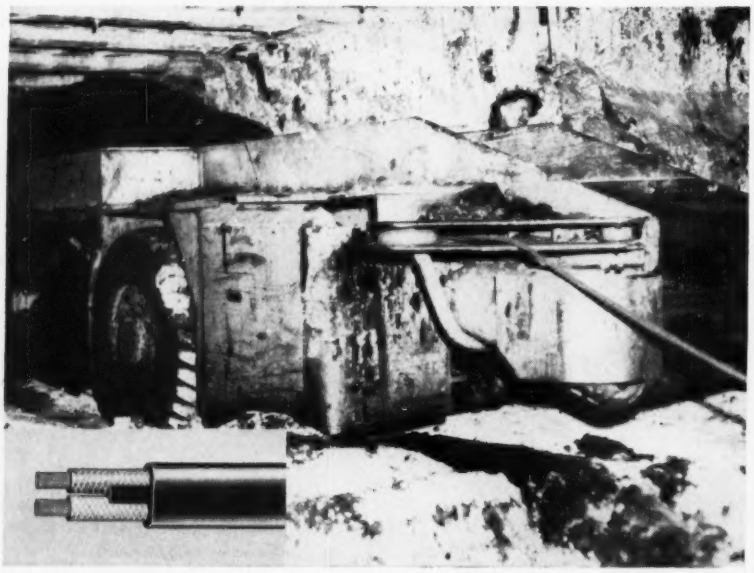
BETHLEHEM STEEL

Mining Machine Cable Must Be Rugged... NATIONAL ELECTRIC INDESTRUCTO IS!



Exceptionally rugged National Electric Indestructo Mining Machine Cable meets the severest service demands under all operating conditions. Service records in hundreds of mines prove it. The cable assembly, conductor and ground wire, is molded in a heavy neoprene sheath to provide the strength necessary for mining operation.

Indestructo is furnished with or without a grounding conductor. The grounding conductor construction assures positive grounding of rubber-tired motorized equipment.

Indestructo comes in a complete selection of sizes for every mining machine application in underground or strip mines.

For additional information write to: *National Electric Division, H. K. Porter Company, Inc., Porter Building, Pittsburgh 19, Pa.*

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PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION, PEERLESS ELECTRIC DIVISION; Specialty Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

"**c.** Any foreman finding a dangerous roof, rib or face condition in any working place shall cause such condition to be corrected and shall order the removal of persons exposed to such danger from the area of danger except those required to correct such condition.

"**d.** Any dangerous roof or rib condition found on roadways or travelways shall be corrected promptly, or traffic thereunder shall be discontinued until the danger has been removed.

"**e.** When there is danger of coal rolling on a person during or after cutting, it shall be spragged by placing blocks in the cut or by blocking with leaning posts.

"**f.** A bar of proper length shall be used to bar down loose material.

"**g.** Crossbars and their supports shall be well secured to prevent them from being dislodged by falling or rolling coal or rock.

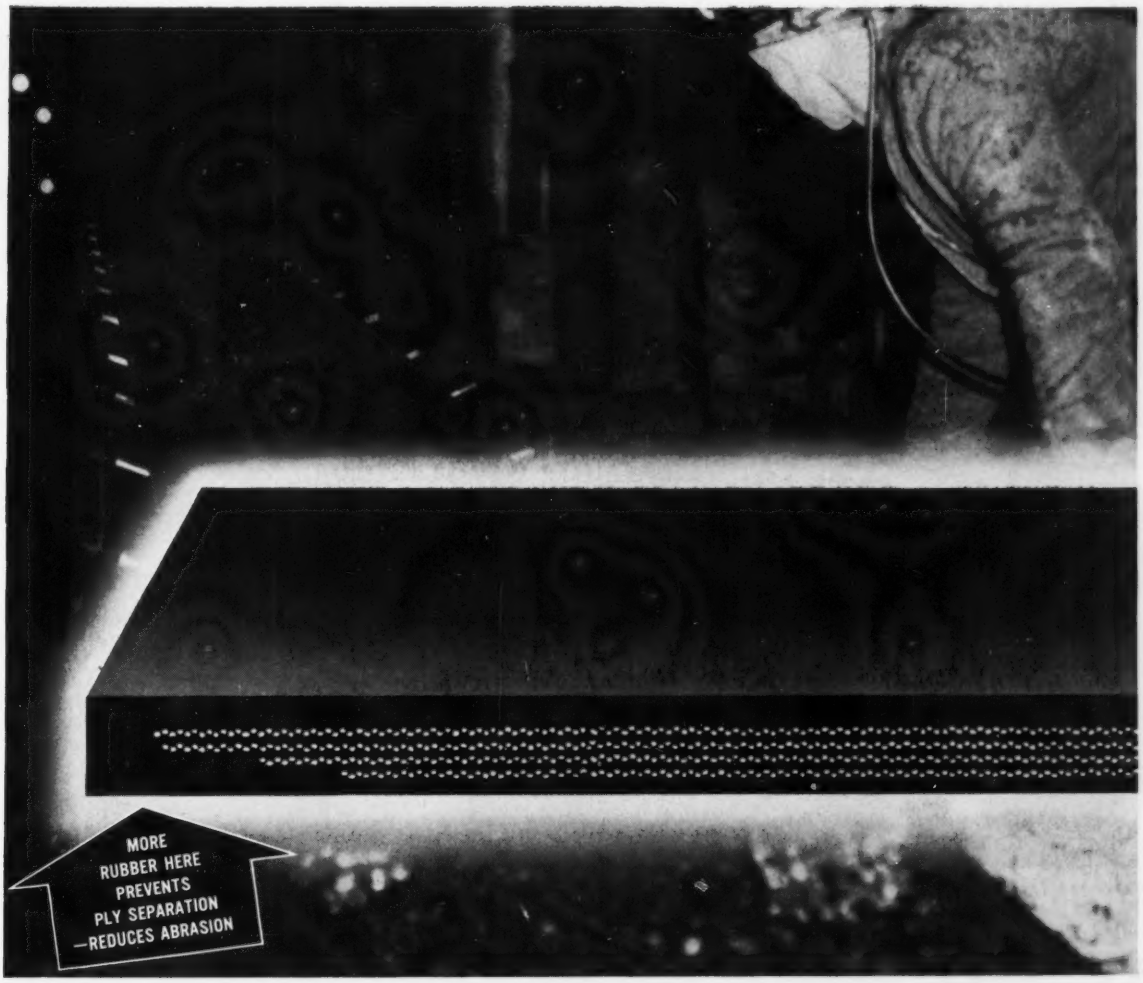
"**h.** When roof bolts are tested, such testing shall be done by qualified persons designated by the mine foreman.

"**Sec. 4. Recovery of Supports.—a.** Recovery of roof supports shall not be done by inexperienced persons unless such persons are being trained by a qualified person. Installed roof bolts shall not be recovered unless adequate temporary support is provided."

It will be noted that the first requirement is a support standard, whether posts, bars, bolts or any combination thereof is employed. This is the heart of any effective support plan, as experience has proved over and over. If, in addition, the standard is automatically supplemented with additional supports when there is the slightest indication of their need, the ultimate in effectiveness is assured—and with it the ultimate in injury and fatality reduction.

The difference between mediocre and good support is so small as to be negligible as far as actual cost is concerned, and any increase is more than offset by higher efficiency and reduction in compensation payments.

Few are the mines that cannot cut accidents from falls of roof, face and ribs more than 50% by the intensive, continuous application of well-known basic principles. All that is necessary is to do it.



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gives Quaker Thermoid Conveyor Belting extra life where it counts

Unique "Coledge" construction puts more rubber *at the edges* where it's needed, prevents ply separation, makes a more flexible and wear resistant edge where abrasion is greatest. Punishment at the edges—especially the tough use dealt out in mining—can kill most conveyor belting in a fraction of the lifetime of Thermoid-Quaker belting.

Tests show Thermoid-Quaker "Coledge" construction lasts and lasts on the same jobs where other belting fails. "Coledge" construction is available on all grades of Thermoid-Quaker belting.

What's more, all Thermoid-Quaker conveyor belting is prestressed in manufacture, so that the belt is actually in compression when you get it—ready for the heaviest load without strain.

Examine Thermoid-Quaker Belting with the exclusive "Coledge" construction at your Thermoid distributor's, or write for further information to Thermoid Division, H. K. Porter Company, Inc., Tacony & Comly Streets, Philadelphia 24, Pa.

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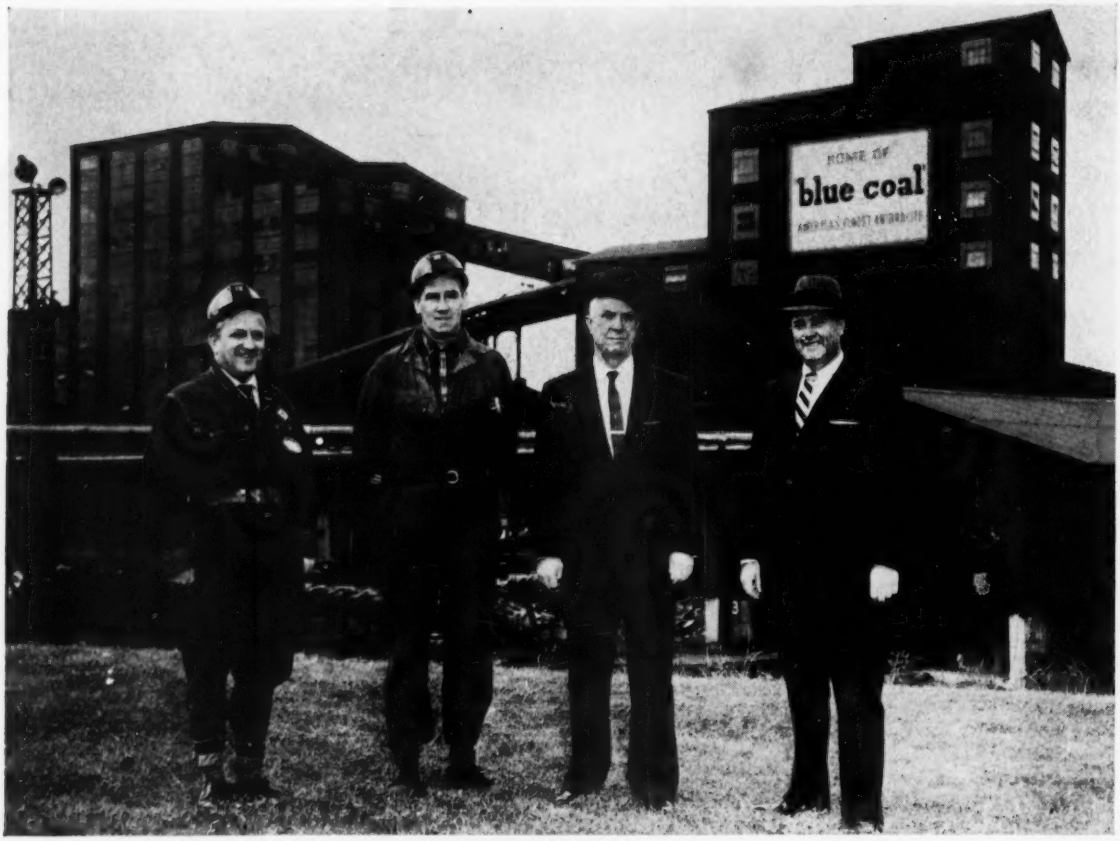


NOW MANAGING Glen Alden Coal: Harold B. Wickey (left), vice president, operations; Ivor L. Williams, general manager, operations; Harry W. Bradbury, president; J. Davison Van Note, vice president, sales.

New Management Fires Glen Alden Recovery

Undergirding resurgence of the Nation's largest hard-coal producer are:

- A major increase in company-mined tonnage.
- A continuing campaign to reduce overhead costs.
- Maximum effective use of conventional equipment.
- Preparation tailored to size and quality demands of today's markets.
- More aggressive merchandising keyed to sustaining dealer confidence and to developing new avenues of growth.

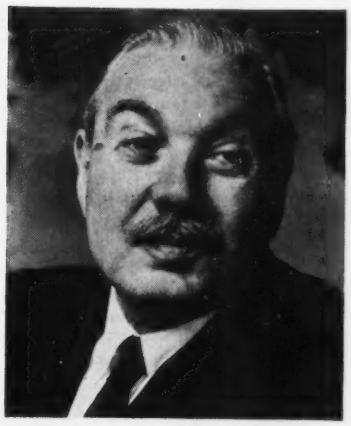
By W. A. Raleigh Jr., Associate Editor, Coal Age

"WE MUST SHOOT for increased mechanization, advanced methods of operation and overall reduction in mining costs . . . We intend to be very progressive in marketing and aggressive in sales."

Enumerated by Harry Bradbury, president, Glen Alden Coal Co., in an exclusive interview with *Coal Age*, these are basic tenets of a new production and sales management philosophy which, in the past 2 yr, has lifted the firm out of the pits of despair and put it on the road to solid recovery, growth and profit.

In the period 1952-57, Glen Alden suffered successive annual losses from anthracite operations which totaled $12,415,000. Mr. Bradbury took office April 1, 1958. By the end of the

Chief Architect and Corporation Boss



ALBERT A. LIST is president, board chairman and "chief architect" of the new Glen Alden Corp.

In October, 1957, a subsidiary of the List Industries Corp., of which Mr. List was president and board chairman, acquired 38.5% of the outstanding stock of the pre-merger Glen Alden Corp. Mr. List and two other List Industries' board members were then invited to become directors of Glen Alden, which was losing money at the rate of $70,000 a week.

Sensing that the core of the dilemma was due to management problems, Mr. List set in motion a chain of events which initiated, and are a near-sure bet to sustain, recovery and growth of the coal concern.

His first job was to pick Harry Bradbury, a veteran of 44 yr of experience in all phases of coal mining, as the firm's new president. Mr. Bradbury, like the man who chose him, had established a reputation for rescuing companies from the red-ink side of the ledger.

With full backing from Mr. List, Mr. Bradbury then built a strong management team to work with him in overhauling the firm's operations philosophies and practices. The result, as noted in the main text, was to turn the tide from loss to profit within months after he assumed office.

The new management's fine showing in 1958 created a "better climate" for consummating a merger with List Industries. Glen Alden stockholders had rejected the merger-proposal early in 1958. They and List Industries stockholders finally approved it April 21, 1959.

Thus the new Glen Alden Corp. was created. It includes RKO Theatres, Inc.; USF-Aspinook Finishing Div., finishers of textile fabrics; E. Hubschman & Sons Div., tanners of fine-quality calf leather; Aluminum Industries, Inc., and its Triplex of America Div., manufacturers of aluminum parts for the automotive and other industries; the Mathes Co., manufacturers of air conditioners and heat pumps; Otis Ry. Warehouses Div.; crude oil and natural gas properties in Kansas.

The big gain coming out of the merger is a much strengthened financial and investment position for all units of the parent company. When formed, the new Glen Alden Corp. counted assets of $125 million; for the purchase of new companies and other investment purposes, independent financial analyses estimated it could generate more than $40 million in cash and had borrowing capacity of $50 million.

With the parent company in such strong financial position, this much is quite clear. Under the dynamic leadership of Albert List and Harry Bradbury, Glen Alden Coal is making no idle boast when it talks of strengthening its lead as top-ranking hard-coal producer and of eventually becoming the Nation's largest integrated producer of anthracite and bituminous coal.

year, bucking recession, a shrinking market for anthracite and the problems of reorganization, he and his top management staff (photo) had already turned the tide from loss to profit. As reported to stockholders:

"Net income from anthracite coal operations, including special items [mainly sales of coal silt banks and real estate], amounted to $2,444,988, as against a loss of $1,833,195 in 1957. The 1958 profit of the coal division, before special items and non-recurring charges, amounted to $957,082, an improvement of $2,790,277 over the year 1957. Gross profit was almost 11% of net sales in 1958, as against only 4% of net sales in 1957."

During 1959, Glen Alden Coal Co., through its sales division, Blue Coal Corp., sold between 2.5 and 3 million tons of anthracite for a gross return of about $30 million. Specific earnings have not yet been disclosed but Mr. Bradbury estimated they were "substantial," adding that "a good amount of improvement" is expected to materialize this year.

To strengthen prospects for improved earnings in 1960 and subsequent years, the firm has already initiated a drive to increase its share of existing hard-coal business. GA's share of total anthracite sales fell from 17% in 1955 to 13.5% in 1957; last year it had already moved back up to between 13.8 and 15.3%.

Plans call for developing new business through a more aggressive attack on commercial and industrial markets where sales opportunities previously had been allowed to fade.

In the picture also is a program to acquire a number of hard- or soft-coal companies with new investment capital resulting from the merger last year with List Industries (see panel —"Chief Architect and Corporation Boss"). Goal is to strengthen GA's position as the Nation's top-ranking hard-coal producer, and eventually to make the firm the largest integrated producer of anthracite and bituminous.

Management Approach: What Makes It "New"

Glen Alden's new production and sales management philosophy boils down to:

1. Improving profit-making potentials through policies aimed simultaneously at increasing production and reducing costs.

2. Striving for maximum effective use of conventional mining equipment.

3. Tailoring preparation practice to highest-quality standards and to size-demands of the market.

4. Backing up an aggressive, well trained sales force with marketing methods which sustain dealer confidence.

GA's management philosophy today is "new" in the sense that it marks a complete "about-face" from the approach of the previous management which had resigned itself to operate under policies adapted to attrition of the total industry.

"We are against the philosophy of the dying industry," Mr. Bradbury stresses. "We will not accept talk of attrition for anthracite . . . we believe the so-called 'dying' trend can be offset with an imaginative approach to production and marketing.

"Our predecessors sought high realization through smaller tonnage. Cutbacks in tonnage, however, were too much for good profits-realization without accompanying plans to reduce overhead items, such as pumping and tax costs. Through a coordinated program of reducing overhead, increasing production and improving efficiencies in mining and preparation, we have improved and will continue to improve the basis for higher profits-realization."

Reducing Overhead: Pumping and Taxes

Mr. Bradbury had an early opportunity to demonstrate his skill in reducing overhead through his approach to burdensome pumping and tax costs. For results gained, his associates have credited him with "extraordinary statesmanship."

"When Mr. Bradbury assumed the presidency on April 1, 1958, Glen Alden was paying a staggering $2,400,000 annually in local taxes," John G. Jaeger, the firm's Coal Div. secretary, explains. "This tax figure was pegged to assessments made many years ago when anthracite was 'king' and the firm was grossing about $100 million yearly. Last year sales were about $30 million.

"The previous management had planned to obtain tax relief by means of court action and preliminary steps along these lines were taken. Mr. Bradbury, however, estimated that it would cost the company $400,000 in legal fees plus the county's legal costs of some $300,000 if the fight were lost. He decided to skirt the legal action and solve the problem through a series of negotiations with local government officials. As a result, he was able to obtain a very substantial tax reduction without resorting to court action."

Mr. Jaeger sums up the story on pumping costs as follows:

"In the Knox mine disaster at Pittston, Pa., January, 1959, water from the Susquehanna River flooded large mining areas, and threatened to add large additional pumping costs in Glen Alden mines. Mr. Bradbury arranged to have state and federal governments participate in the cost of pumping the flooded areas, thereby assuring continued safe operation of the properties."

Mr. Bradbury looks for further cooperation and material benefits from various government and State agencies on these heavy pumping problems. In January, 1960, for example, the USBM announced approval of a new anthracite mine-water control project at Hudson Coal's Delaware-Pine Ridge mine. Four more pumps will be added to an existing pumping plant in the mine's No. 2 shaft. Authorities expect the installation will remove the threat of flooding Glen Alden's Huber and Sugar Notch mines, two of its main producing units. GA will operate and maintain the pumps; federal and state governments will share the cost of moving the pumps from another anthracite area and installing them.

Upscaling Production

Overall plans call for upscaling annual tonnage produced and sold by Glen Alden from 2.5 to 4 million tons.

Glen Alden Coal's Top Streamlining Operations,

HARRY W. BRADBURY, president, is a rare blend of skills in finance, engineering and human relations. There is no problem, big or small that he, himself, has not tackled in the field of coal mining.

As a young man, he wielded the miner's pick, and ever since has retained a strong identification with the individual coal worker. This has manifested itself over the years in a warm relationship with John L. Lewis and other UMWA executives. On various occasions, long and bitter strikes have been averted by virtue of the warm, mutual respect of the two men.

Mr. Bradbury has been similarly at home negotiating with governors and legislators on measures helpful to the industry, or in working out a plan with his engineers on the opening of a new shaft.

Mr. Bradbury joined Glen Alden in 1958, challenged by the problem of putting this largest producer of anthracite on a profitable basis. His success is now a matter of history. The company has shown a healthy profit in both 1958 and 1959.

Before joining Glen Alden he was president of the Lehigh Valley Coal Co. During his 4 yr as chief executive of that company, he also turned a severe financial retreat into a profitable advance. At various times he has been general manager, Cameron Coal Co., Pittsburgh; general manager, Illinois Fuel Co., Sparta, Ill.; general manager, Moffat Coal Co., Sparta; operator of the Illinois-Missouri Coal Co., Sparta; director, Standard Ore & Alloys Corp., New York; builder and operator, Green Diamond mine, Marrissa, Ill.; and builder, operator and president of the Bradbury mine, Midwest Utilities Coal Corp., Sparta.

HAROLD B. WICKEY, vice president in-charge-of operations is, like Mr. Bradbury, proficient in the intricacies of engineering, finance and human relations. People close to Glen Alden management say both officers have been cast from the same mold.

Mr. Wickey has been a notable builder of men, both within and without the companies with which he has been associated. For a number of years he taught night classes in the field of mining at West Virginia University. Every man who studied under him passed his state examinations, and a West Virginia examiner once commented, "We always know the men trained by Wickey."

He began his mining career with the Valley Camp Coal Co., Wheeling, W. Va., in 1935 as a junior engineer following graduation from Penn State University. A year later he was appointed preparation engineer for the Davis Coal & Coke Co., Thomas, W. Va. He quickly rose to assistant to the general superintendent in the company.

Management Team . . . Marketing Practice

During World War II he served with the War Production Board in Washington D. C., subsequently joining Pittsburgh Consolidation Coal Co. as a divisional superintendent. In 1949 he became vice president, operations, Pennsylvania Coal & Coke Co., Cresson, Pa., and in 1953 vice president, operations, Lehigh Valley Coal Co. The following year Mr. Bradbury joined Lehigh Valley. When Mr. Bradbury went to Glen Alden in 1958, Mr. Wickey went with him.

IVOR L. WILLIAMS, general manager, operations, has a reputation for being able to work out solutions to 'impossible' production problems.

During the past 2 yr he has contributed heavily to streamlining the company's production methods, substantially increasing productivity. He has increased the company's use of mechanization in underground mining from 40-60% in the past 18 mo, and also has been instrumental in improving a number of the company's cleaning and treating processes.

Mr. Williams obtained his mining and engineering education from Pennsylvania State University, and for a number of years taught Pennsylvania State evening classes for men seeking mine-foreman and assistant-foreman certificates. He worked for the Susquehanna Collieries Div., M. A. Hanna Co., before joining Glen Alden.

J. DAVISON VAN NOTE, vice president in charge of sales, Blue Coal Corp., has dedicated himself to turning Glen Alden into a "sales-minded company."

"For years our company, like so many in the industry, was looking at its problems with blinders on," Mr. Van Note has said. "We were preoccupied with the production end of the business to the detriment of sales. We now are learning to improve the way we sell existing markets. Beyond this, we expect to expand into new markets."

Mr. Van Note brought to the company a number of effective marketing techniques. He has instituted a control system for measuring the "quality" of various categories of sales volume. He has set in motion machinery for sales-forecasting, and through effective liaison with the company's production departments has linked sales-forecasts and production-scheduling. He has strengthened the company's dealer organization, helping dealers over the rough spots, and teaching them how to improve profits in the sale of anthracite. Also, he has instituted a teletype system for handling orders efficiently.

Mr. Van Note joined Blue Coal in 1947 as traffic manager. His subsequent posts included director of distribution and traffic, vice president—Eastern Regional Sales, and general sales manager. Before Blue Coal he was with the Central R. R. of N. J.

The firm has a daily production capacity of 15,000 tons.

Built into plans for higher output is a policy to increase company-mined tonnage (mostly underground).

When Mr. Bradbury assumed the presidency, company-mined coal made up about 35% of total tonnage produced and sold. Since then, the percentage has risen to 65% and is expected to continue rising. Note, for example, the following:

At Huber mine, average daily output moved up from 949 tons in 1958 to an estimated 1,380 tons last year, with a continued upward movement to 2,500 tons visualized.

During the same years, daily production at Wanamie mine jumped from 2,333 to 3,634 tons and further increases are under study.

At Woodward mine (reopened following Mr. Bradbury's arrival), output averaged 524 tons late in 1959 and was expected to reach 1,000 tons daily by February, 1960.

Mr. Bradbury categorically denies plans to lease any more of GA's properties for mining purposes. Leases now held by strip operators and others are to exhaustion of coal on the site. "Among other reasons," he says, "we are convinced that use of our own supervisory and mine forces provides greater control over coal quality and, in turn, over sustaining confidence with customers."

Improving Mining, Preparation Practice

Reductions in overhead costs and higher production volume have been accompanied by a drive for greater efficiencies in mining and preparation practice. "As a total result, we have cut the cost of producing our coals by at least 20% per ton," Mr. Bradbury notes. For this achievement he gives major credits to Harold B. Wickey and Ivor L. Williams, respectively, vice president and general manager, operations.

Individually well qualified, the two officials together make an unusually fine operating team. Associates characterize Mr. Wickey as "a versatile officer, proficient in the intricacies of engineering, finance and human relations"; Mr. Williams as a "hard-driving" manager with "a reputation for being able to work out 'impossible' production problems."

Under the immediate direction of Mr. Wickey and Mr. Williams, GA's push for greater production efficiency has stressed:

1. Increased mechanization, including use of machines previously idle.

2. Higher productivity through better supervision, improved maintenance and more effective use of all types of conventional mining equipment.

3. Reorganization of preparation practice to suit quality and size demands of today's markets.

One particularly outstanding improvement has been more use of conveyor haulage from the face. GA's operating officials find that such haulage reduces costs considerably compared to previous experience with leased operations where less efficient methods were employed. Plans call for adding more conveyor units as new mining areas are opened up.

GA's operating officials also point to substantial gains in maintenance through standardizing equipment. "Instead of three types of shuttle cars, for example—a situation which inherently led to parts-replacement and

COMPANY PERSONNEL enter GA's new office building, Wilkes-Barre, Pa.

other maintenance headaches—we now have one."

Along with various mechanical improvements in treating processes, a complete reorganization of preparation practice has featured more use of fine-coal cleaning equipment and use of clean water. "Both our markets and trade have responded favorably to appreciable differences in quality and to higher output of fine sizes," Mr. Bradbury states.

Restoring Dealer Confidence

"BE ASSURED . . . Your needs and demands for clean, carefully prepared anthracite can be satisfied completely by Glen Alden and its corps of courteous dealers." This is a basic theme which GA's new management adopted in an aggressive campaign to restore dealer confidence and to encourage more dealers to carry "Blue Coal."

In marketing its coals, the firm has had to rebuild a feeling of confidence among our dealers by reassuring them:

1. That Glen Alden is now under sound, progressive management.

2. That highest quality and service standards, and lowest possible prices, will be maintained.

3. That an increased storage program allows for any sudden upward fluctuations in demand—some 250,000 tons of all sizes are now kept on hand—enough to load hundreds of cars a day.

Mr. Bradbury backed up the campaign to upgrade dealer relations with a topnotch sales and marketing staff headed by J. Davison Van Note, vice president in charge of sales. Besides sparkplugging the dealer confidence campaign, Mr. Van Note has directed an intensive training program for all executive and field-force sales personnel. He is also credited with (1) introducing a more effective system for relating sales cost to pricing policies in various marketing categories, and (2) with achieving better coordination of sales-forecasting and production-scheduling.

Planning for Growth

Although total production of hard coal reached its lowest historical point in 1959 (19.5 million tons), Glen Alden expects to turn in "substantial profits" for the year. The company meanwhile looks forward to higher production and improved earnings in 1960 and later years.

Mr. Bradbury is no starry-eyed optimist but firmly believes anthracite's future offers challenging prospects for growth to well managed companies.

For one reason, he notes that a greater degree of production stability is already evident. The industry's annual tonnage dropped sharply in the 7 yr period 1948-54 (from 59.1 to 26.6 million tons). But a leveling-off of the declining trend during the past 5 yr (from 25.9 to 19.5 million tons) gives real promise that a tonnage-plateau will soon be reached.

Highlighting other trends, Mr. Bradbury comments, in substance, as follows:

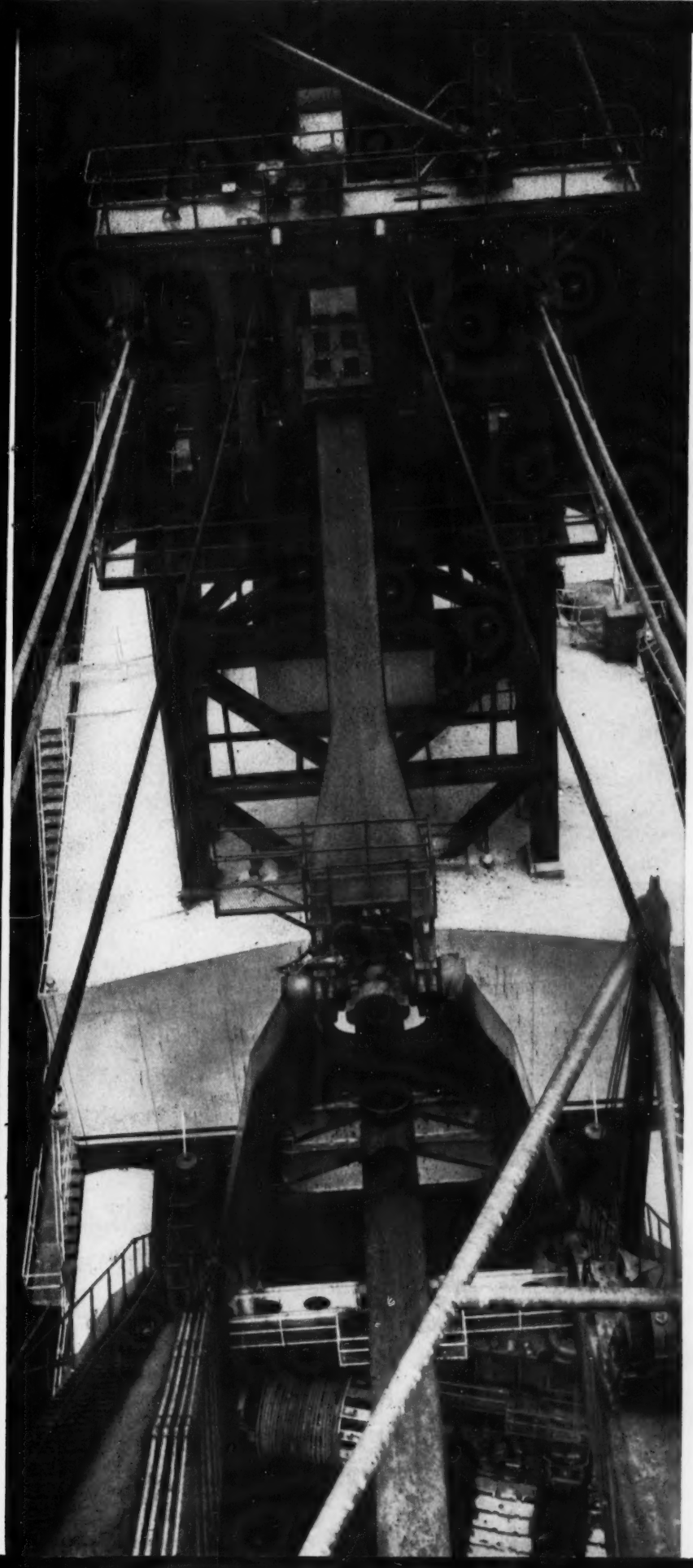
- Some further erosion of domestic sales is likely because of continuing inroads by oil and gas. However, it should be possible to offset, or more than offset, these losses through more aggressive pursuit of opportunities in the industrial and commercial markets.

- In the industrial market, sales to electric utilities should remain steady; the steel industry is expected to increase use of fines in sintering, taconite-pelletizing and coke manufacture; and there are long-term possibilities for anthracite in the chemical field, which may materialize in the pects for direct use of anthracite in the blast furnace. Considerable refuture. Also in the picture are prossearch by the USBM had demonstrated the technical feasibility of this use. If the price gap between anthracite and coke closes in the years ahead, commercial interest could pick up sharply.

- Hard-coal companies must work more closely with architects and building contractors in developing the commercial market. Schools and hospitals, for example, offer immediate opportunities for new sales.

- Not much hope is held out for reviving anthracite exports, which have nose-dived during the past 3 yr. Aside from other reasons, Russia has moved into prime European markets—France, Belgium and the Netherlands—and U. S. producers cannot deliver hard coal at competitive prices with comparable low-ash content, particularly in view of ocean transport costs and Russian government subsidies.

- Fortified with the country's largest reserves of quality anthracite, Glen Alden should always get at least its share of existing markets. Now, however, with operating practices streamlined and with more aggressive selling, the firm will push hard to carve out a bigger share. Furthermore, chances are better-than-fair that present plans to acquire a number of hard- or soft-coal companies will open up new avenues of growth.



Crow's nest view of (USS) Tiger Brand– America's No.1 Wire Rope

Imagine yourself at the top of the boom of one of the world's largest shovels. You're 147 feet up—as high as a 14-story building. The only supports you have are the four 3⅝" Tiger Brand Boom Support Strands shown at the left and right of the picture. But don't worry, these strands have a total strength of 3,072 tons . . . and they are designed to resist vibration and shock.

The two hoist ropes in the center lift a bucket that scoops up 100 tons of rock and dirt. These are 2⅝" diameter Tiger Brand Ropes that take a real pounding when the bucket rams into the rock and shale. They move about 60,000 yards of overburden in a regular 8-hour shift.

Most of the big shovels in use today are equipped with Tiger Brand Rope because it moves more tons of material at least cost for rope.

Why Tiger Brand is your best buy

1. It is made by a company that maintains the most complete research and manufacturing facilities in the steel industry.
2. It is designed by one of the country's most capable staffs of wire rope engineers. It is serviced by thoroughly experienced field representatives always ready with their assistance.
3. Every type of Tiger Brand Wire Rope is designed for specific applications. You get the *right* rope for the job.
4. It is made by one company, U.S. Steel, and every step of production, from ore to finished product, is carefully controlled and supervised to guarantee *one* high standard of quality.
5. Tiger Brand Wire Rope is manufactured by the foremost single wire rope producer in the country.

For more information, write American Steel & Wire, Dept. 0142, 614 Superior Ave., N.W., Cleveland 13, Ohio.

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What's different about Haulpak®?

ANSWER: The LW Haulpak is like other off-road trucks *only* because it has wheels and an engine! Otherwise, its design is completely different... for your benefit. For instance:

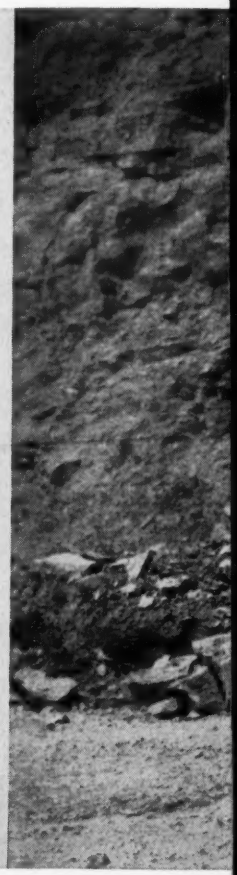
RIDES ON AIR — Other trucks ride on steel springs that need much attention. Haulpak eliminates this major cause of downtime with the exclusive LW HYDRAIR* suspension system. With it, Haulpak *rides on air*... the load rides smooth and level on rough roads. You can safely use faster hauling speeds, move more tons per hour. Hydrair also makes possible many other advantages:

SHORTER TURN RADIUS — Because Hydrair suspension eliminates need for conventional springs and

Notice the deep "V" body which permits Haulpak to carry about 25% of its load below what would be the floor line of a conventional hauler. This gives greater stability, permits faster travel on turns and steep grades. ▶

Here's HYDRAIR

This sturdy, simple air-hydraulic suspension replaces the usual leaf springs found in conventional off-road equipment, relieving Haulpak owners from expensive spring repair and maintenance. Hydrair cushions against loading and travel shocks, compensates automatically for off-center loading, and keeps the load riding level over bumps and holes, for faster, more profitable hauling cycles.



Question 2:

How does Haulpak save you money?

ANSWER: From the answers above you can easily see how this all-new hauler *saves* on hauling costs, gives you:

- **greater maneuverability**
- **lower operating cost**
- **lower maintenance**
- **faster hauling**
- **more pay-tons per hour**
- **...and bigger profits**

front axles, Haulpak's front wheels can be turned at sharper angles . . . permits U-turns in 2/3rds the space required by competitive trucks. And without need for springs and axles, Haulpak can be built with a shorter wheelbase for more efficient transfer of power-to-wheels. There is, however, no loss in load capacity, because you get the LW exclusive . . .

DEEP "V" BODY — This permits carrying about 6 tons of material *below* the normal floor-line of conventional trucks. It also gives you a lower center of gravity, better stability on turns and steep grades.

HAULS THROUGH DEEP MUD — Haulpak is equipped with the famous LW power-transfer differential, used for many years in thousands of heavy-duty Tournapull® earthmovers all over the world. When one drive wheel begins to slip, power is transferred automatically to the wheel on firmest footing. Soft going does not stop Haulpak!

MANY OTHER MONEY-SAVERS! You save on fuel, because Haulpak is built of the newest lightweight high-tensile strength steels . . . to reduce deadweight and increase pay-load. Also, Haulpak gives you power-shift Torqmatic transmission, full power-steering, multiple-disc brakes with 5,148 sq in. total braking surface, double-acting hydraulic rams that lift body to 70° tilt in 16 seconds for fast dump. And lubrication check is reduced to only 3 easily-reached fittings needing attention only at 500-hr intervals. Haulpak is not just a "beefed-up" highway truck . . . it is a totally new concept developed to cut off-road hauling costs.

Next time you need an off-road hauler, investigate Haulpak. Now available in 3 sizes: 22, 27, and 32 tons capacity. Request literature, and ask to see our new color movie, "*Revolution on Wheels*".

*Trademark HP-2261-G-2

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

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Where quality is a habit

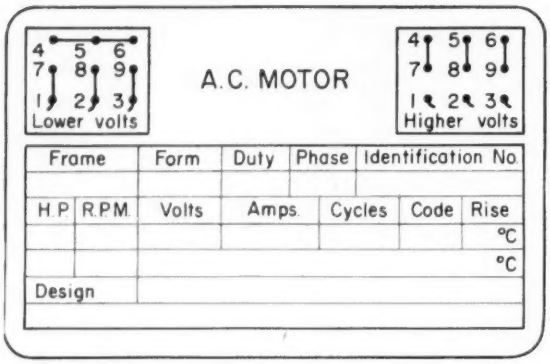

FIG. 1—Basic data required for a field-testing program are normally found on the nameplate of the motor. Standards provide that a minimum of information must be given on general purpose AC and DC motor nameplates.

How to properly use standard information and nameplate data to achieve . . .

Better Motor Maintenance and Field Testing

L. L. Lipanye
Reliance Electric & Engineering Co., Cleveland, Ohio

A PREVENTIVE MAINTENANCE ORGANIZATION should have, among other things, an effective motor-maintenance program if it is to be successful. When motors fail production downtime and repair cost, compared with other types of breakdowns, usually are greater. A program, with two main objectives in mind, should provide:

1. Routine motor service to assure minimum downtime.

2. Periodic inspection to determine condition of motors to head off major troubles.

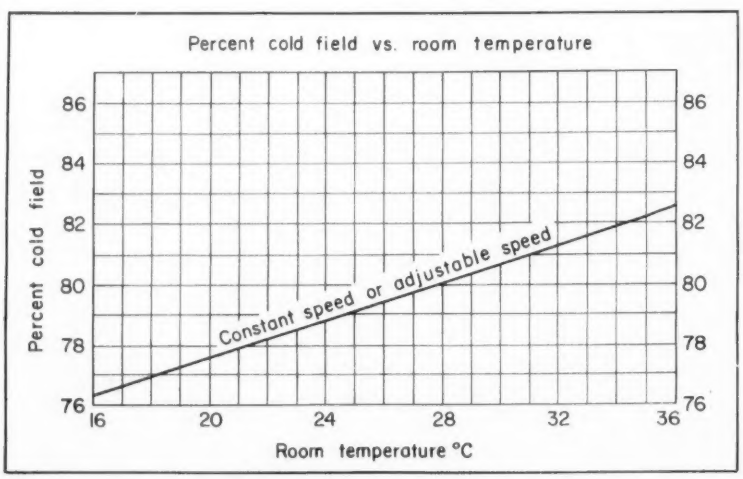

FIG. 3—Variations in speed due to load change from full-load cold to no-load hot are approximately the same as the variations for cold field vs room temperature as shown in the above graph.

To effectively approach these objectives some general knowledge of standard motor tests and tolerances is required. Sources of information on this subject, however, may not be available to the field repairman. Even when it is, the material generally is slanted toward the motor manufacturer.

A better understanding of test procedure and the use of motor data and instruments will simplify many of the problems related to a motor-maintenance program. These include:

1. Nameplate data and standard information.

2. Simple test procedures and application of a few basic test instruments.

3. A standardized system for recording motor data, test measurements and results.

4. A systematic method of comparing test results.

Our aim is to advance this simplified approach by combining information from several sources in a concise, readily-usable form. Certain factors which emphasize the need for standard maintenance field testing procedures and methods of data comparison will be treated separately.

Paper presented at the 1959 Fall General Meeting of AIEE.

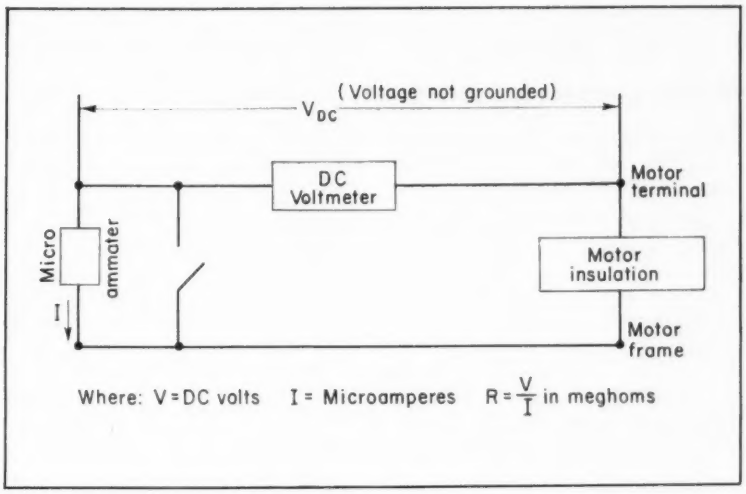

FIG. 2—Insulation resistance measurements by the ammeter-voltmeter method shown at left should follow a definite cycle. Procedure is to apply 500 V DC for 60 sec before taking the DC volts and microamperes readings.

Nameplate Data

The basic data required for a field-testing program are normally found on the nameplate of the motor. The nameplates vary in shape, size and content. However, NEMA (National Electrical Manufacturers Association) standards provide that a minimum of information must be given on general-purpose AC and DC motor nameplates. Typical data required by NEMA for AC motors are:

Manufactureres' type and frame designation.
Horsepower output
Time rating
Temperature rise
Full-load RPM
Frequency
Number of phases
Voltage
Full-load amperes
Code
Design letter

Nameplate data for DC motors are similar. Items such as frequency, number of phases, code and design letter are omitted, but type of winding (shunt, stabilized shunt, compound or series) is included.

On both nameplates blank space is provided for additional information, such as, service factor, special insulation or special environmental conditions. All nameplate data should be used as a primary source for comparison of motor speed, field current, etc.

Many applications require "custom" or "built-in" types of motors. The nameplate data on these may vary in form and content. Horsepower, for example, may be special and duty may be compressor, mine or definite short-time period. Special and standard motors normally have nameplate data listed by one or more of the following standardizing organizations:

National Electrical Manufacturers Association (NEMA)

American Institute of Electrical Engineers (AIEE)

American Standards Association (ASA)

United States Bureau of Mines (USBM)

Underwriters Laboratory (U/L)

Field Testing AC Motors

Tests given in the ASA and AIEE standards may be used on a routine basis to determine satisfactory motor condition and performance for AC polyphase induction motors. These tests consist of the following:

1. No-load.
2. Locked-rotor.
3. Dielectric.
4. Insulation resistance.

No-Load Test—This test consists of measuring speed and current input with no connected load at rated frequency and voltage. Motor should run until input becomes constant. Currents should be measured in each line and then averaged to obtain motor line current. If no-load watts are measured significant variations from previous tests on the same or equivalent motors can indicate trouble due to preloaded bearings, misconnected windings, improper lubrication or a combination of the three. Variations of 25% or more in no-load watts and 10% or more in no-load current should be investigated.

It is important when carrying out these tests and also other tests which will be discussed to record data during each test and maintain accurate records.

Locked-Rotor Test—Requirements for this test are to subject the motor to severe mechanical stresses and high heating while it is connected to a large power source. Locked-rotor current is usually 400% to 600% of full-load current. Due to the nature of this test it is not generally used. It is, however, covered in more detail along with an alternate test elsewhere in this article.

Dielectric Test—This test consists of applying a specified high voltage successively between each electric circuit and the motor frame with all windings not under test grounded to the frame. The motor manufacturers' tests requires that a specified AC voltage be applied for 1 min using a frequency of 25 to 60 cycles.

An equivalent high-potential test involves using 1.2 times the 1-min voltage applied for 1 sec. AC polyphase induction motors larger than ½ hp require twice the rated voltage, plus 1,000 V for 1 min, or 1.2 times the 1-min voltage for 1 sec.

A reduced value of test voltage, not to exceed 85% of the original test voltage, is recommended when repeated high-potential tests are necessary after the motor has been installed on equipment.

An insulation-resistance test should be made on motors that have been in service for some time or exposed to moisture, dirt, carbon dust or other contaminants before a dielectric test is performed.

Insulation Resistance Test—Insulation resistance is the resulting value of measured applied DC voltage divided by current at a given time—usually 1 min—after applying the voltage. Apply DC voltage—500 V up to 600 V rated and up to 5,000 V for higher terminal voltages—for

AC Motors

Variations and Tolerances from Rated Conditions

NEMA, AIEE and ASA standards limit permissible variations from the rated operating conditions of standard AC polyphase induction motors. The principal variables with brief comments on motor-performance deviations are as follows:

Voltage—Standard voltages are 110, 208, 220, 440, 550 and 2,300. Voltage tolerances are plus or minus 10% at rated frequency.

A voltage variation of 10% affects the power factor, efficiency, torque and slip in proportion to applied voltage squared. A 10% increase in voltage, for example, improves efficiency, lowers power factor, increases torque and lowers slip (decrease approximately 17%).

Frequency—Tolerance is plus or minus 5% at rated voltage. A higher frequency results in better power factor, increased speed and lowered locked-rotor torque.

Combined Voltage and Frequency—Tolerance is plus or minus 10% provided frequency variations are within the 5% limit.

Speed—Variation in slip shall not exceed plus or minus 20% when measured at rated voltage, frequency, and load, and also at an ambient temperature equal to 25 C.

Slip RPM = Synchronous rpm — Full-load rpm

Where,

synchronous

$$\text{RPM} = \frac{120f}{P}$$

f = Frequency in cycles per second

P = Number of poles

Service Factor—For 3 hp and up all general-purpose and other continuous-duty motors with a 40 C rated temperature rise have a service factor of 115% when operating at rated voltage and frequency. This means that motors may be operated continuously at 115% of the nameplate rating without harmful heating although the nameplate rise may be exceeded.

Fifty-Cycle Operation

There are occasions when it is desirable to apply a 60-cycle motor to a 50-cycle source of AC. This may be done only where the altered characteristics provide suitable speed, torque, current and temperature-rise characteristics. Expected variations from 60- to 50-cycle performance are:

Speed—A 60-cycle motor operating on 50 cycles will give ⅚ of the 60-cycle synchronous speed. The full-load speed will be approximately ⅚ of full-load speed at 60 cycles.

At lower than 60-cycle rated voltage the slip will increase (approximately) inversely with the square of the ratio of voltages.

Torque—The full-load torque in lb-ft—operating on 50 cycles—will be approximately ⅚ of the 60-cycle full-load torque.

Locked-Rotor Current—The locked-rotor current of a motor operating under the same condition will be approximately 15% higher in amperes than the 60-cycle value. The code letter on the nameplate applies to 60 cycles only.

Temperature Rise—The temperature rise will be 50 C without a service factor when a 60-cycle 40 C-rise general-purpose AC motor is operated on 50 cycles at the 60-cycle voltage and horsepower rating.

DC Motors

Variations and Tolerances from Rated Conditions

Standards have been established for DC motors. The most common variables and limits that apply are as follows:

Voltage—The nameplate voltages normally are 115 or 120 V and 230 or 240 V. Other common nameplate voltages are 125, 250 and 500. Voltage tolerances are plus or minus 10%, unless otherwise noted.

Speed—The variations in speed due to load change from full-load to no-load hot—operated within the rated speed range—should be close to those shown in Fig. 3. Tolerances of plus or minus 5% usually apply.

Variation in speed due to heating for industrial Class B motors when operated from full-load cold to full-load hot is plus or minus 15% of full-load hot speed.

Variation from rated speed at normal operating temperature, rated load and voltage, and full field current is plus or minus 7½%.

Overload Capacity—A standard DC motor is capable of carrying a minimum of 150% of full-load current at base speed and rated voltage for 1 min throughout the rated speed range. (Refer to manufacturer's instructions for other overload conditions.)

Service Factor—All general-purpose and continuous-duty motors having a rated temperature rise of 40 C have a service factor of 115%; that is, they can operate continuously at 115% of rated load at rated voltage and speed.

Operating Characteristics With Voltage Variations

It is assumed that voltage variations within the plus or minus 10% tolerance allowed will have little effect on motor performance. Variations up to plus or minus 30% will have some effect. However, no serious effects other than loss of production at undervoltage and some decrease in insulation life are apparent. Motors should not be operated when voltage variations are plus or minus 30%.

Motor speed will vary (approximately) directly with the applied line voltage. When a lower voltage is applied it will result in a slower motor speed in direct proportion to the voltage. This results in less work done by the motor since:

$$\text{Horsepower} = \frac{\text{Torque} \times \text{RPM}}{5{,}252}$$

Where RPM = revolutions per minute.

With a lower applied line voltage, a shunt or compound motor will require increased line current to produce the required load torque. A series motor, however, will take slightly less line current at reduced voltage.

Motor heating will be affected in proportion to the change in internal losses and ventilation. In a shunt or compound fan-cooled motor, for example, reduced line voltage gives less cooling due to decreased speed while internal losses increase. This results in an overall effect of increased motor temperature with reduced voltage.

1 min with the windings a few degrees above dew point to avoid condensation. All windings not under test should be grounded to compare the winding under test with other windings and also to ground. Direct measurement of insulation resistance may be made with a self-contained hand- or power-driven ohmmeter and generator. An alternate volt-ammeter method will be described later.

The measured resistance values should be corrected to 40 C by the formula:

$$R_{40\,C} = K_{t\,40\,C} \times R_t.$$

Where, $R_{40\,C}$ = Insulation resistance in megohms at 40 C.

R_t = Insulation resistance in megohms at measured temperature.

$K_{t\,40\,C}$ = Temperature coefficient (See Table I).

This value can then be compared to the recommended minimum value by the formula:

$$R_m = \frac{\text{Rated terminal voltage}}{1{,}000} + 1$$

Where R_m = Megohms at 40 C of entire machine winding.

When insulation resistance values are less than the above minimum recommended value the windings should be cleaned, dried and impregnated with an approved insulating varnish. The measured stator-winding resistance, corrected to a given temperature, is another useful comparison if taken at periodic intervals and after the stator has been rewound.

A simple test that can be performed to check doubtful rotors for open bars consists of exciting one phase of a stator winding with rated frequency at 25% rated voltage and then noting the current variation as the rotor is slowly rotated through a complete revolution. Current variation in a single revolution in excess of 10% usually indicates open-rotor bars. Variations in slip of more than 25% may also be taken as an indication of open-rotor bars.

Field Testing DC Motors

DC motors have a series of routine tests which help keep close check on motor condition. A number of these tests can be made while the motor is at standstill; others must be performed while the motor is running.

Table I—Temperature Coefficient of Insulation Resistance (K_t 40 C)

Winding Temperature, Deg. C	K_t 40 C
0	0.063
10	0.125
20	0.250
30	0.500
40	1.000
50	2.000
60	4.000
70	8.000
80	16.000
90	32.000
100	64.000

Table II— Allowable Variations From Nominal Motor Air Gaps

Nominal Air Gaps, In.	Tolerance, Plus or minus, %
0.020 to 0.100	0.0050
0.100 to 0.200	0.0075
0.200 and greater	0.0100

Test Made at Standstill

Resistance—Resistance measurements of motors made at regular intervals should be corrected to the same temperature and then compared for accurate interpretation of data and condition of insulation. A temperature compensation chart (see illustration) gives percent of field current to be applied. This chart is based on current measured while fields are at room temperature.

The resistance-bridge or voltage-drop method can be used to obtain field-resistance values. A variation of field-circuit resistance greater than 5% can be checked by measuring the potential drop across individual coils for indications of shorted turns or variations in number of turns and wire size of replacement windings.

Air Gap—Measurements are usually made with a feeler gage placed at the center of the pole face and between it and the armature. Gaps should be measured to a minimum accuracy of 0.005 in. Air gaps between each pole and the armature should be equal. Specified gaps and tolerances are given in Table II.

Unequal gaps indicate bearing and support wear and/or improper shimming of poles. Effects are poor commutation and changes in motor speed.

Insulation Resistance and Dielectric Tests—The tests discussed in the AC motor section also apply to DC motors.

Brush Setting—Factory-tested motors are adjusted for correct neutral setting of brushes. The brush stroke is usually dowelled or marked for neutral location. If the armature is replaced or rewound the neutral setting should be checked. Improper adjustment can cause excessive sparking, variations in speed and stability problems under load.

Correct neutral setting can be determined by the kick-neutral method which employs a low-reading DC voltmeter. Voltmeter leads are connected to the commutator segments and spaced one pole pitch apart—90 deg on 4-pole motors and 180 deg on 2-pole motors. Voltage readings are obtained by applying approximately 25% of the normal field current and then interrupting it by opening a knife switch in the field-winding circuit. By turning the armature through a small arc and repeating the switch cycle, a position will be obtained with a zero voltage reading. This position, which also is the position of the voltmeter leads, is the neutral point for the brushes. Brushes are then set in this position and the yoke and bracket marked. Brush spacing should be held within $\frac{1}{64}$ in for good commutation.

Where the armature is not free to rotate a variation of the preceding method is to move the voltmeter leads instead of the armature, provided care is taken to keep the leads one pole pitch apart.

(Continued on p 100)

Table III—Speed Variation Tolerances Due to Load, Full-Load to No-Load Hot-Type Winding

	Speed Range			
	Base Speed	Base to 199%	Base to 200 to 299%	Base to 300 to 400%
Shunt and stabilized-shunt	..	15	20	25
Compound	25	..	..	..
Stabilized-series	50	..	..	..

Locked-Rotor Test

Measurement Using Rated Voltage and Frequency

Reduced voltage readings give a lower than proportionate current since a saturation factor of approximately 110% to 115% is normally present at full voltage. Extreme caution should be taken during this test because a locked rotor with polyphase power produces very high mechanical stresses and heating. Two rules must always be observed: (1) determine direction of rotation prior to test and (2) start with a cold machine and limit readings to 5 to 10 sec each to avoid excessive temperature build-up. Locked-rotor torque may also be measured but care should be taken to obtain the minimum locked-rotor torque with angular position of the rotor at rest.

An approximation of locked-rotor torque can be obtained by the following formula:

$$T_{LR} = .9 \times \frac{7.04}{\text{Synchronous RPM}} \times (\text{Input} - \text{Stator } I^2R) \text{ in lb-ft.}$$

Alternate Test

Where rotor-locking means are not available an alternate test consists of applying current to any two line terminals of a three-phase motor. This will give approximately 86% of the current expected when using three-phase power. A comparison can then be made with a three-phase power test.

Where reduced-voltage locked-rotor tests are made, calculations may be made as follows:

V_T = Rated line volts.

V = Locked volts (less than rated).

$I_L{}^1$ = Locked current per phase at V_L.

$PL^{1/3}$ = Locked watts per phase at V_L.

$$I_L = I_{L1} = \frac{V_T}{V_L} = \text{saturation factor}$$

= Locked current per phase at V_T.

Saturation factor may be taken as 1.3.

$$\text{Power input}_{LR} \text{ per phase} = \frac{P_L{}^L}{\sqrt{3}} \times \left(\frac{V_T}{V_L}\right)^2 \text{(at rated voltage } V_T\text{)}.$$

$$\text{Power factor}_{LR} \text{ per phase} = \theta_{LR} = \frac{P_L{}^1}{\sqrt{3}\, V_L \times I_L{}^1}$$

Assume power factor does not change appreciably with voltage.

Tests Made While Running

No-load Test—This test provides data on speed, armature volts and amperes, and field volts and amperes for DC motors. The field amperes are determined by manufacturers' data or measured field resistance.

Series motors must be tested at reduced voltage if they cannot be loaded to insure that speed will not be excessive. As a general rule speed should not be more than twice the nameplate value at full load.

For shunt, stabilized-shunt, compound and stabilized-series motors no-load speeds can be determined from full-load speeds given on the nameplate by applying the percentages given in Table III.

For adjustable-speed DC motors it is desirable to obtain readings at both base and high speeds.

References:

"Polyphase Induction Motors and Generators," AIEE No. 500, Dec. 29, 1954.

"Test Code for Direct-Current Machines," AIEE No. 501, July, 1957.

"Recommended Guide for Testing Insulation Resistance of Rotating Machinery," Proposed Revision AIEE No. 43, May 27, 1959.

"Standards for Motors and Generators," Pub. No. MG 1-1959, January, 1959, Pt. 4.

"Alternating-Current Induction Motors, Induction Machines in General and Universal Motors," ASA No. C50.2, October, 1955.

"Effect of Voltage on DC Mining-Machine Motor Performance," AIEE Conf. Paper 55-816.

Tips on Belt Conveyor Maintenance

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Hewitt-Robins Incorporated

GOOD DESIGN, REGULAR INSPECTION and proper housekeeping will help reduce breakdowns and add life to your belt conveyors. The benefits of a good belt-conveyor maintenance program are increased production and lower repair and replacement costs.

The beginning, and also the end, of proper belt-conveyor maintenance is good housekeeping. This does not mean cleaning up a conveyor line monthly or every 2 mo; it means maintaining a clean conveyor system at all times.

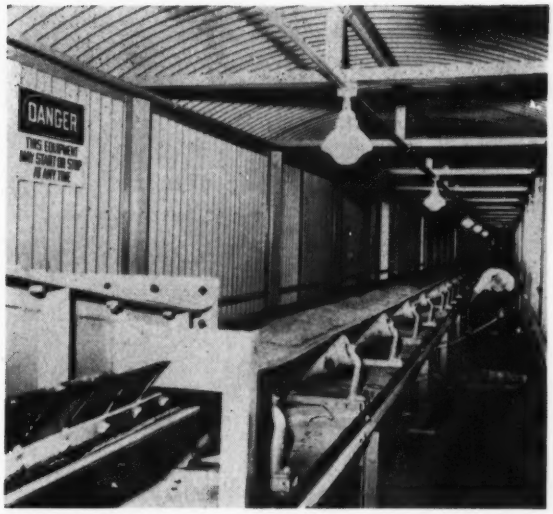
Daily and weekly inspection schedules are important. The patrolman on the conveyor system should be responsible for making quick daily examinations to detect dangerous conditions. Emergencies should be reported immediately so that the conveyor can be shut down and repaired.

Weekly inspections should be made by a foreman. He also should make a more detailed quarterly inspection. The results should be in written form for submission to the maintenance superintendent, who should see to it that necessary corrections are made to the conveyors.

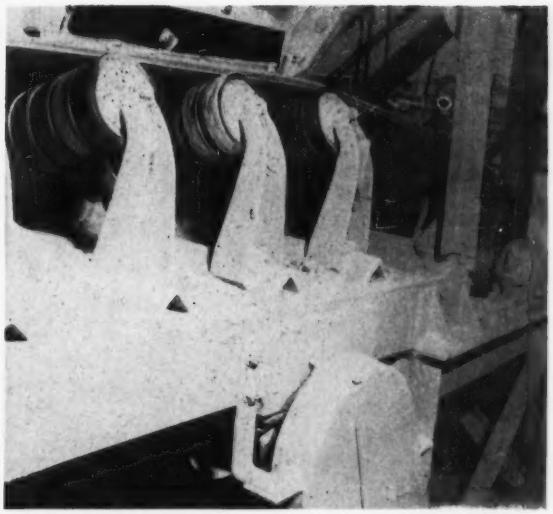
The following check list can be used as a guide to daily inspections. Additional check points may be needed to fit particular situation.

Belts

1. Look for and correct conditions which could cause material to spill onto return strand. This will prevent material from getting between belt and pulleys.



FLOORS AND AREAS surrounding conveyors should be cleaned regularly. Frequency of cleanup depends on conditions.



PILE-UP OF MATERIAL around idlers reduces efficiency and causes excessive wear. Loading points need more care.

2. See that the belt is properly trained and that it does not come in contact with the steel structure. This is especially important on the return run. Normally, the return run does not receive the attention it needs. Do not let this happen in your inspection program.

3. Breaks in cover or carcass and gouges or worn spots should be marked and reported for early repair.

Idlers and Pulleys

1. Mark "frozen" or damaged idlers so that they can be repaired or replaced.

2. Check troughing, training and return-training idlers for proper operation.

3. Check scrapers and plows to make sure that they are doing the job they were intended to do.

4. See that material does not build up on decking or floor under idlers and pulleys. This is especially important at training idlers.

5. Watch for and eliminate material built up on idlers or pulleys.

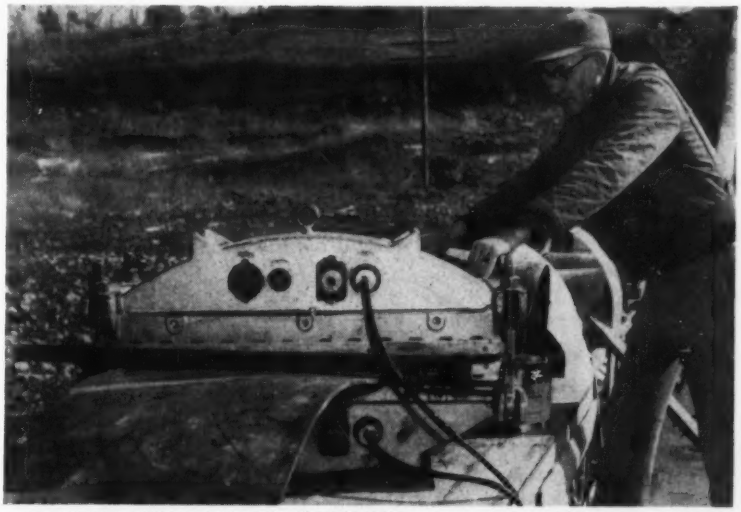
6. Inspect grease seals to make sure they are not leaking excessively. Grease is harmful to belts.

Chutes and Hoppers

1. Correct conditions which could cause material to clog or "bridge".

2. Prevent large lumps from dropping directly onto an unprotected belt.

3. Make sure that material is fed onto center of belt and that the belt is not overloaded.



PROPER DESIGN AND INSTALLATION are essential to full conveyor life.

Lubrication

Lubrication plays a vital part in the performance of idlers and other conveyor components. The primary functions of lubrication are to:

1. Dissipate heat caused by deformation of load-carrying members.

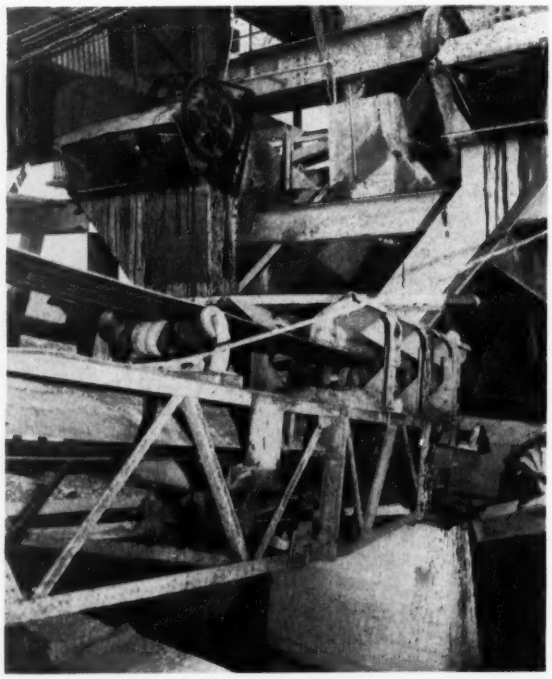
2. Prevent rust or corrosion of the bearing parts.

3. Aid in protecting bearings against dirt, water and other foreign materials.

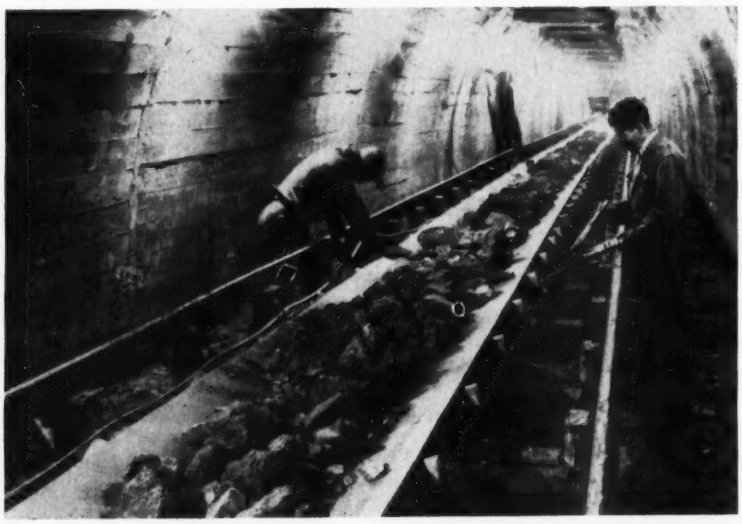
Of the three preceding functions only the last two are important to idlers. Experience has shown that abrasion of the rollers and raceways is a major cause of bearing failure. Failure is never due to metal fatigue in idlers as is often the case in general bearing applications.

The major requirements for an idler lubricant are: (1) resistance to leakage through the grease and dust seals and (2) protection against corrosion. Tests of various greases used in idlers under actual operating conditions have shown a marked difference in the ability of greases to be retained in the bearing housings without leaking through the seals. An analysis of the tests shows that the less-expensive No. 2 con-

SKIRTBOARDS should be used to confine material to the center of belt at loading points and to reduce spillage.



BELTS SHOULD BE PROPERLY TRAINED and kept away from steel structure. Note buildup of material on center idler.



PROPER REGULATION protects bearings and reduces wear of other conveyor parts.

sistency calcium-base cup greases generally are more satisfactory than higher-priced ball- and roller-bearing greases. The water-resisting properties of the calcium-base greases also are a valuable asset since wet conditions are present in many belt conveyor applications.

After selecting the correct grease the next problem is to determine what lubrication schedule will give the best results. Tests and examinations of idlers operating in the field show that idlers are greased too often, thus causing excessive leakage through seals. We have found that idlers lubricated with the proper type of grease need be re-lubricated only every 4,000 hr of operation under normal service conditions.

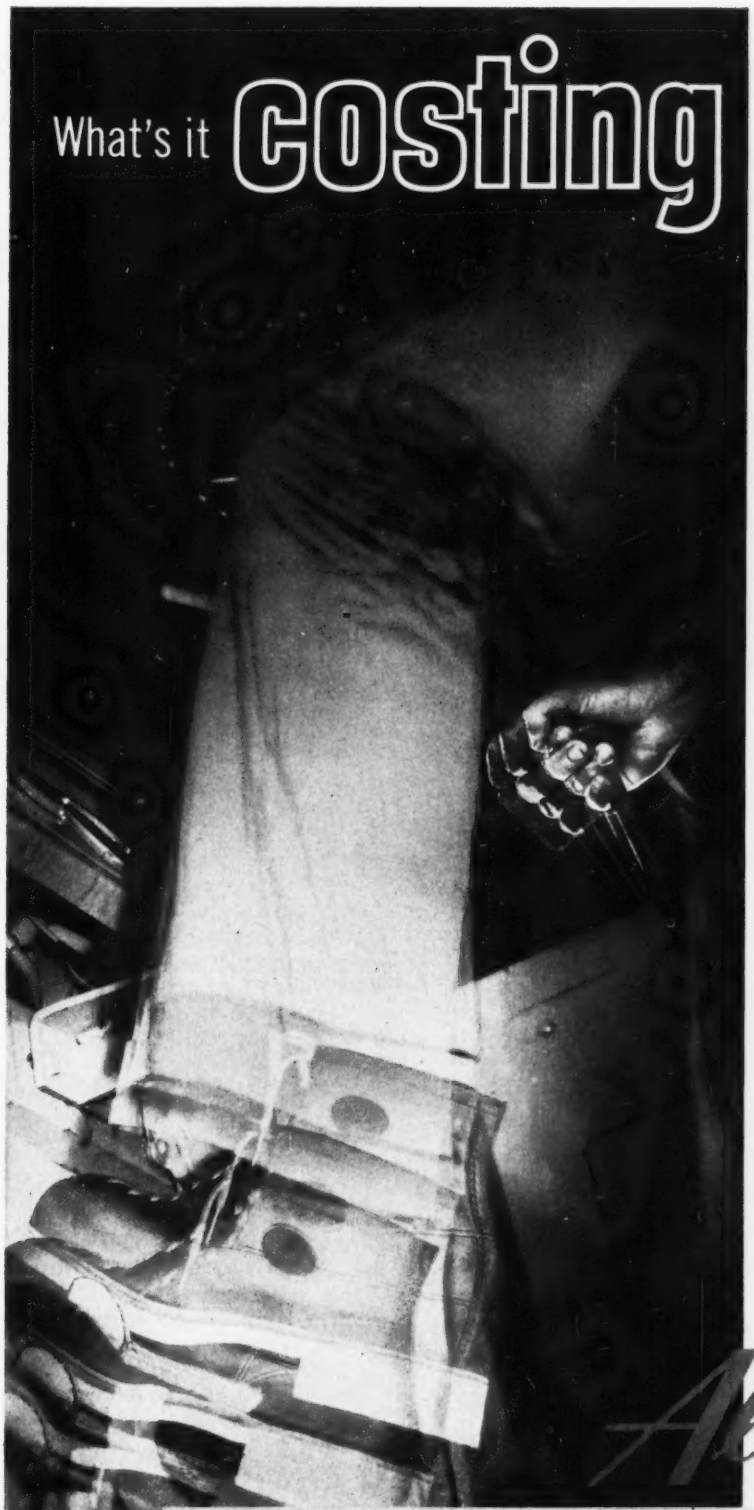
However, service conditions vary considerably. The areas around loading, transfer or discharge points are sometimes extremely dusty. In such instances the lubrication schedule must be increased. The frequency, however, can only be determined by experience under existing conditions. If there is any doubt as to proper lubrication intervals, the best way to check is to select a representative idler and disassemble it after a period of operation to check the condition of bearings and seals, and the amount and quality of grease remaining in the bearing chamber.

Designing for Maintenance

A well designed conveyor which has been properly installed can go a long way toward making your subsequent maintenance easier.

Impact and abrasive wear on conveyor belts occurs at the loading point. Consequently, it is important that feed chutes discharge material gently and as near belt speed as possible. If the material contains large abrasive lumps, it is advisable to feed fines to the belt prior to discharging the lumps. The fines will then cushion the lumps. This can be done by notching the mouth of the chute or placing a screen in it. Impact idlers also should be used

What's it costing you to train new drivers?



$1,000? $1,500? $2,000? These are normal costs for training new operators—except for TORQMATIC DRIVE owners. They report saving up to $2,000 every time they break in a "rookie."

Reason? TORQMATIC takes guesswork out of shifting – ends shock-load damage and the need for engine-disconnect clutch repairs. TORQMATIC *automatically* adjusts engine output and speed to load or terrain changes.

TORQMATIC owners know that no operator can handle the "stick" and clutch as smoothly and efficiently—*every* time – as an Allison TORQMATIC. They bought TORQMATIC because they know, too, what it costs when rookies make a shifting and clutching mistake.

How can you eliminate these costs?

Look beyond first cost and see the total cost. Then change from clutch-pedal equipment to Allison TORQMATIC. You'll save costly engine-disconnect clutch replacements, too-frequent overhauls of overtaxed engines, repair bills for shock-load-damaged axles and drive lines.

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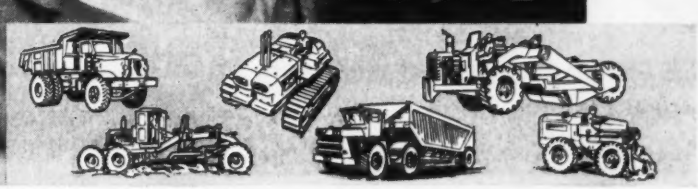

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to cushion large heavy lumps fed directly onto a belt. Cushioning will extend belt life considerably.

Adequate clearance between belt and chute should be maintained to prevent scraping contact. Trapped lumps between belt and chute or other parts of the structure will damage belt. Correct conditions which would permit this to happen. Brushes or scrapers can be used to help prevent sticky material from being trapped between belt and pulleys.

Belt Tension—Tension should not be excessive. Apply only enough tension to keep belt from slipping on drive pulley and to minimize sag between idlers. Too much tension is harmful to belts. Improper tensioning can result from poor maintenance of idlers or pulleys, excessive tightening of takeup screws, too much weight on gravity takeup, temperature changes, overloading the belt and belt shrinkage caused by exposure to moisture.

Where sufficient space exists, automatic takeups, properly weighted, usually will pay for themselves by compensating for changing conditions without the necessity of constant manual readjustment—often done by guesswork or not done at all.

Skirtboards—These boards should always be used to confine material to the center of the belt at each loading or transfer point. They can be made of wood or steel. The skirtboards themselves should not come closer than 2 or 3 in to the belt. The remaining gap should be bridged by fastening rubber strips to the skirtboards and allowing them to extend onto the belt. Do not use old belting on skirtboards or scrapers. The carcass of old belting is too rigid and will wear grooves in the main belt. In addition, fines will become trapped in the carcass and act as an abrasive. Special skirtboard and scraper rubber is available and should be used. Skirtboards should be installed so that they taper outward and lift slightly off the belt in the direction of travel.

Belt cleaning—Material buildup on return idlers sometimes causes a belt to run off-center. The presence of this material usually means that additional cleaning devices, such as, scrapers, water sprays and squeegees are needed. Some materials, due to their adhesive nature, cannot be satisfactorily cleaned or scraped from the belt. In such cases the use of rubber disc idlers or rubber sleeves installed over standard idlers may be necessary on the return run of the conveyor.

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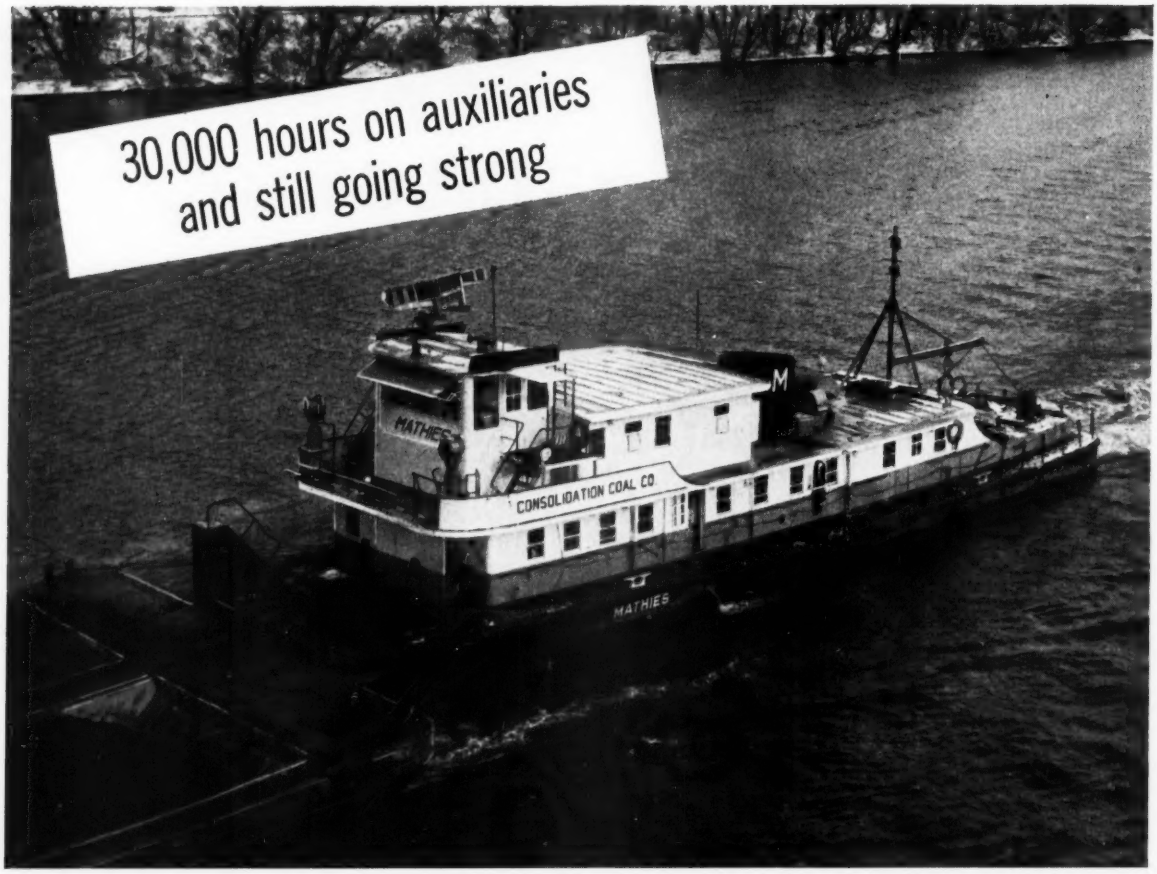

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Brattice Cloth Efficiency

Laboratory and field studies of brattice materials show that double-warp cloth and No. 1 jute with standard treatment are the better choices when properly installed.

James J. Scott, Instructor, Dept. of Mining and Metallury, University of Wisconsin, Madison, Wis., and

L. K. Marshall, Mining Engineer, American Brattice Cloth Corp., Warsaw, Ind.

LITTLE WORK has been done to determine the efficiency of brattice cloth as a ventilation barrier in mining operations. Thousands of yards of material are sold each year by various companies to mine operators and very little thought has been put forth to determine the worth of various types of material for this application. Some material must certainly be better than others. This report will attempt to rank some common types of brattice materials so that the mine operator can better ascertain if he is using the material which is best suited to his particular operation.

Webster's dictionary defines brattice as: "a wall of separation in a shaft or gallery, erected for deflecting air toward the working face." Many years ago sail cloth was used in Eastern coal fields as a brattice material. It was relatively airtight and cheap. If used sails were installed, they were already flame-resistant due to salt water. Today Indian Jute is used most often, although canvas and plastic materials are also available. If a woven fiber is used, there must certainly be some leakage of air through the material due to the looseness of the weave.

High costs involved in mining today demand that all phases of the operation be as efficient as possible to lower overall costs. It has been reported recently that the weight of air pumped into coal mines in the United States is estimated to six times the weight of coal produced. It has been stated that in general, less than 50% of the air going into a coal mine reaches the working face, so we might assume that ventilation is one of the least efficient operations in mining. Leakage through doors, stoppings and curtains account for a major part of this inefficiency.

The following investigations are intended to assess the comparative values of different types of brattice cloth. This investigation was carried out in two parts. They were:

1. **Laboratory investigation**
2. **Field investigation**

Materials Used

The materials, furnished by American Brattice Cloth Corp., which were used in this investigation are as follows:

Jute:

No. 3—10¾ oz per yd—yard count 11x14 per sq in,
No. 1—14 oz per yd—yard count 11x24 per sq in,
Double Wrap—16⅔ oz per yd—yard count 12x14 per sq in.

The 10¾-oz and 14-oz jute are standard grades in the brattice cloth industry. The double warp cloth has twice as many yarns woven in the warp direction and each yarn is doubled for an effective yarn count of 24x14. The high quality jute fabrics are especially woven for the brattice cloth industry in the A & B Grade Mills of Calcutta.

Cotton Canvas:

No. 7—10-oz cotton wagon duck—yarn count 38x30

This is a double-warp material with 76 effective yarns in the warp direction. In both jute and cotton grades the weight per yard means weight before flameproofing treatment. There is considerable variation in amount of pick-up in different kinds of flameproofing chemicals added.

Plastic:

No. 15—15-gage (15 oz per yd) Koroseal plastic, yellow in color.

Weight of plastic material is expressed in finished weight as it comes from the mill.

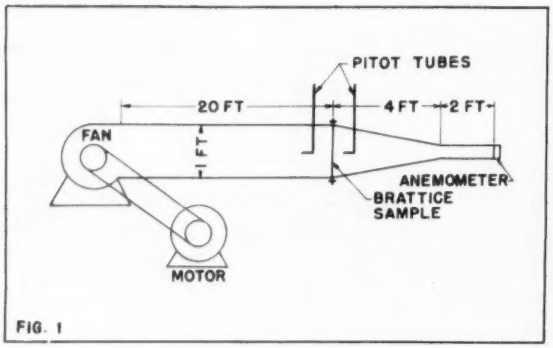
Treatment of Cloth

There are two types of treatment normally used on flameproofed brattice cloth. These are standard treatment and dry treatment.

The standard treatment produces a flameproof, fire-resistant and mildew- and rot-resistant brattice cloth. This treatment may be applied in jute, cotton, or other fiber material. In the material tested the standard-treatment chemicals contained a yellow dye to make the cloth more visible. After going through a tank of hot chemicals, it passes through rolls which squeeze out excess chemical and moisture. The cloth may then be rolled for shipment or run through a dryer to drive out additional moisture. However, as the chemical treatment base is slightly hygroscopic, the material will pick up a certain amount of moisture from the air, and in the usually high relative humidity of mine air will feel slightly damp to the touch. This is not to be confused with the old fashioned wet treatment which left the brattice cloth wet, dripping and slippery. Actually, this hygroscopic effect is desirable in that the absorbed moisture swells the fibers of the threads and makes the cloth more airtight. This is demonstrated in the leakage tests to be discussed later.

Dry Treatment

The dry treated material is made flame-resistant in a non-hygroscopic chemical. After treatment in the hot solution it is squeeze rolled and put through the dryer. This makes a completely dry roll of brattice cloth, which



LABORATORY TEST SETUP for determining leakage was employed on various samples of cloth.

is preferred by some mines because it is a bit lighter in weight and easier to handle.

Plastic brattice cloth has its flame-resistant properties built in, as it is part of the basic properties of the plastic used.

Proper Use

Proper use and efficiency go hand in hand. In this report we are referring to the efficiency in terms of leakage through the material. Proper use refers to hanging of material in the opening, and leakage over, under or around the brattice.

Brattice cloth has been hung in many improper and inefficient ways, most of the time either through habit or carelessness. Of course, there is an economic limit when cost of labor to hang or seal a curtain is of more import than the air lost. However, brattice cloth can be hung well, with a minimum of air leakage at little extra cost of labor.

Most mining men have seen curtains torn from one place and rehung at some other place with a large rip down the middle. If the man who hung the curtain was ventilation-minded, he might have attempted to fasten the rip together with nails. We have also seen curtains hung in great loops, or curtains that did not reach the floor, or curtains obviously cut to fit by measuring across a narrow top of an opening with no allowance for the widening of the opening toward the floor. Curtains have been hung in a zig-zag fashion, as the man who hung them searched for a convenient crack in the roof to drive a nail or roof bolts to which a wire could be attached.

There are as many good ways to hang temporary stoppings, or line brattice, as there are bad. The main features of a well-hung curtain are that it reaches the floor and laps 8- to 10-in on the pressure side of the curtain. It must be hung reasonably tight, straight and from a sufficient number of points so it does not sag and will stay close to or against the roof. It is good practice to hang it from the indentations in the rough top so it will be tight over the humps. If curtains are joined, they should have sufficient lap so no leakage occurs. Torn curtains should not be rehung.

Laboratory Investigation

A multiblade fan equipped with a V-belt drive to a 5-hp variable speed, DC motor was used as a pressure source for the tests. The fan discharge was attached to 20 ft of 1-ft-square metal duct which was smooth and airtight. The sample of brattice cloth to be tested was placed over the end of the 20-ft duct and an additional duct was bolted onto the 20-ft duct to make as tight a seal as possible. (See Fig. 1.)

The additional duct was made in the shape of an inverted cone so that the discharge velocity would be ten times the velocity in the 1-ft-square section. In this way small leakage values could be measured. Pitot tubes connected to inclined manometers were installed on each side of the brattice sample to record the pressure drop from the high to the low power side. An anemometer was used to record the velocity of the air at the discharge.

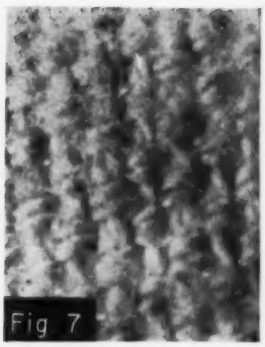
Laboratory Procedure—The sample of brattice material to be tested was bolted in place in the duct with the fan in the off position. The inclined manometers connected to the pitot tubes were adjusted to zero. The fan motor was then started and the speed of the fan was gradually increased until some leakage could be recorded. Pressure and anemometer reading were then taken. In some samples it was impossible to detect leakage until a relatively high pressure was attained. Pressure and velocity readings were taken at various settings and the results recorded.

Results—Information obtained by running the tests on various pieces of brattice cloth were plotted on a graph which shows leakage in cfm per sq ft against total pressure drop through the brattice material.

Photographs were taken of the various brattice materials tested and are shown in Figs. 2 through 7. The physical appearance of the cloth is used to support data which was obtained in the tests. The photographs magnify the cloth approximately eight times.

Discussion of Photographs

Figs. 2 through 7 show the fibrous structure of each of the materials tested. It is difficult to establish definite conclusions from Figs. 2 through 5 which show the No. 3 and No. 1 jute materials with the dry and standard treatments. The difficulty arises from the difference in texture of jute from one piece to another even in the same weight material, i.e., a piece of No. 3 jute may look very much like a piece of No. 1 jute if



MAGNIFICATION at approximately 8x clearly shows superior tightness of double-warp cloth (Fig. 6).

care is not taken in selection of the area to be photographed.

The double-warp and cotton-duck materials were superior to the No. 1 and No. 3 jute in the tests and the photographs of these materials (Figs. 6 and 7) also tend to support this conclusion.

Due to the hygroscopic nature of the chemicals used in the standard treatment process, the fibers tend to swell and develop a more airtight cloth. It is difficult to note this effect in the photographs but experimental results would seem to support this conclusion.

Graph Limitations

It is difficult to apply the results in Fig. 8 to any single mine. If more efficient brattice materials are used in the mine, the pressure drop across the brattice structure may be expected to increase. As pressure increases, it must be realized that existing ventilation controls leading to the working area may become less efficient through leakage, and thereby lower the expected pressure increase at the working face.

Laboratory Results

Comparison of the three grades of jute shown in Fig. 8 would indicate that the No. 1 jute, standard treatment, is approximately one and one-half times more efficient than the No. 3 jute, dry treated. The double-warp material is even more efficient and appears to be approximately one and one-half times more efficient than the No. 1 jute, standard treatment.

It is obvious that the No. 3 jute, given either the dry or the standard treatment, is not a good barrier material. At best it might be used to deflect air when the pressure drop across the brattice is very low.

Given a dry treatment, No. 1 jute is better than the No. 3 jute material, but the No. 1 jute with the standard treatment is much better than the No. 1 treated dry. The cost of the No. 1 jute with either treatment is the same so there is no question but that the standard treated material will be more satisfactory. It appears that the No. 1 material would serve very well as a curtain brattice and in many cases where high pressures might be encountered.

The double warp material and the cotton duck are both very good brattice materials. Cotton duck is especially good at low and medium pressure values as the curve is reversed as compared with the other materials. Cotton

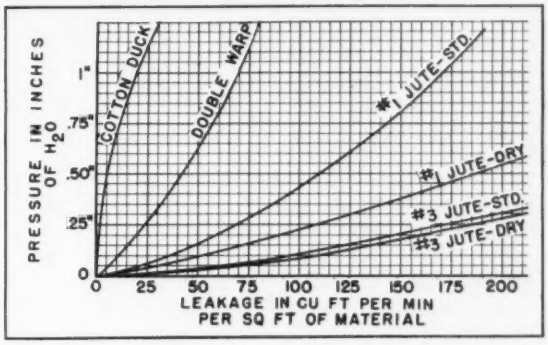


FIG. 8—LEAKAGE through various brattice materials.

duck has only 10 cfm per min per sq ft leakage at ½ in. wg.

It is shown in Fig. 8 that the double-warp material has the greatest strength of all the materials tested. It is slightly heavier than the other materials and with its double warp construction this may be expected.

Plastic was not tested during this investigation as it is obviously airtight. Plastic therefore would be an excellent brattice material if the edges could be properly sealed.

Field Test Procedure

The first test was to determine leakage through stoppings made of brattice cloth of different grades. This stopping was set up in an entry which was one of two carrying fresh air into a development area in which work had been temporarily discontinued. There was no traffic circulation in the area, so no difficulty was encountered by shuttle cars pumping air ahead of them down the entry, or by doors being opened and closed.

The second intake airway was closed off (See Fig. 9) with a plastic curtain by spads from the roof and both ribs, and with 1-ft lap at the floor. When the test curtain was closed, there was considerable leakage as the increased air pressure blew this plastic curtain out at the bottom. The test opening was a 6-ft-high and 16-ft-wide entry which had 13,000 cfm passing through it, at a velocity of 135 fpm, with the plastic curtain over the other intake entry and the test entry open. Mine conditions were: main fan exhausting 152,235 cfm at 4.80 in wg. At the test location relative humidity was 90%, the temperature was 65 F, and the barometer was at 30.28 in of mercury.

(Continued on p 110)

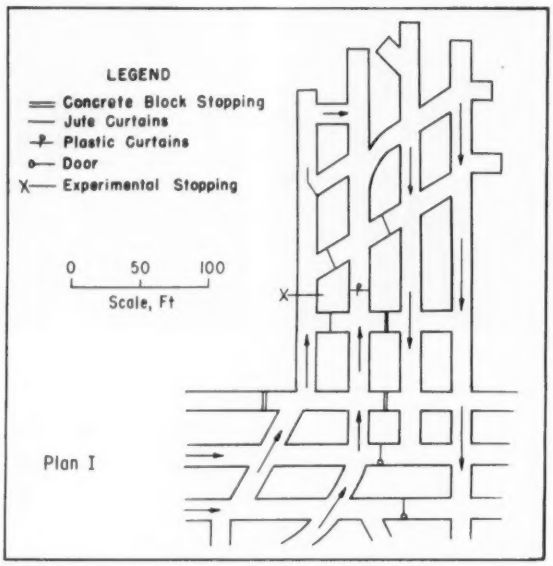


FIG. 9–EXPERIMENTAL stoppings were constructed across intake airway in idle section.

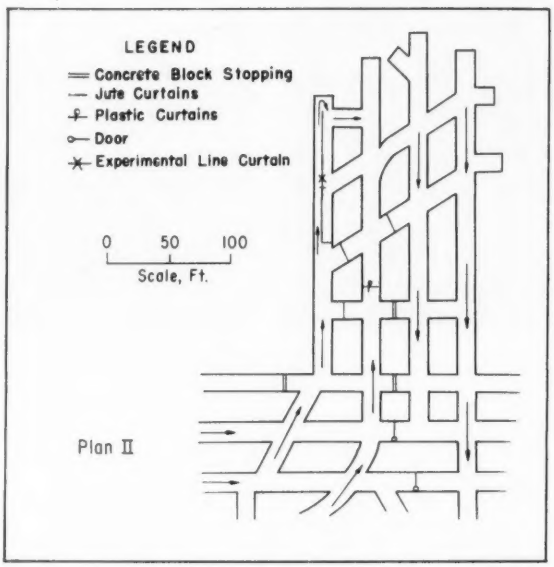


FIG. 10–LINE CURTAINS for field tests were 100 ft long, 4 to 5 ft from rib in 16-ft-wide opening.

A wooden frame was erected in the test entry and brattice cloth was stuffed into the opening caused by the irregularities of the coal at the edge of the frame, not a complete seal, but a common method of constructing a well-built temporary stopping. Each of the materials to be tested was in turn fastened by nailing to the frame, and air velocities immediately beyond the stoppings were measured with a smoke tube and converted to volume of air passing. For each type of material a total of 12 readings were taken across the width of the section and averaged. An attempt was also made to measure pressure differences on either side of the curtain. A magnahelic, graduated to read to 0.02 in, wg, was used to measure pressure differences.

Table II shows the test results on a medium velocity airway.

An attempt was made to make the same test in a location where there was a high velocity. High velocity areas were found but in each case we could not handle the curtains to close off the large entry due to the high velocity. However, a comparative test was conducted on a stopping with a door between the intake and return off the main east haulage.

Table III shows the results of leakage through material hung over a door which, when open, passed air at 600 fpm or 3,390 cfm. Due to change in cross section beyond the door accurate smoke tube measurements were difficult to get.

The last test was for leakage through a line brattice. This was done in the same area as the first stopping test. This line brattice went up along the entry to within 20 ft of the face. A jute curtain was hung part way across the entry at the mouth of the line brattice, thus directing all the air through the line brattice. This line brattice was 100 ft long and in this case passed one open cross cut. It was hung about 4 to 5 ft from the rib which is not excessive for a 16-ft wide opening (Fig. 10).

The line curtain was hung from spads driven into the roof with a spad driver at about 2-ft intervals. The curtain material was then hung from the spads by nails which first pierced the material, went through the hole in the spads and through the material again. This was done 3 or 4 in below the top edge of the cloth, so the extra cloth on top could help close up the top gap. Each curtain was hung in the same manner from the same spads. There was from 8 in to 1 ft overlap on the floor and the curtains were hung tightly enough to conform, as much as possible, to the irregularity of the roof.

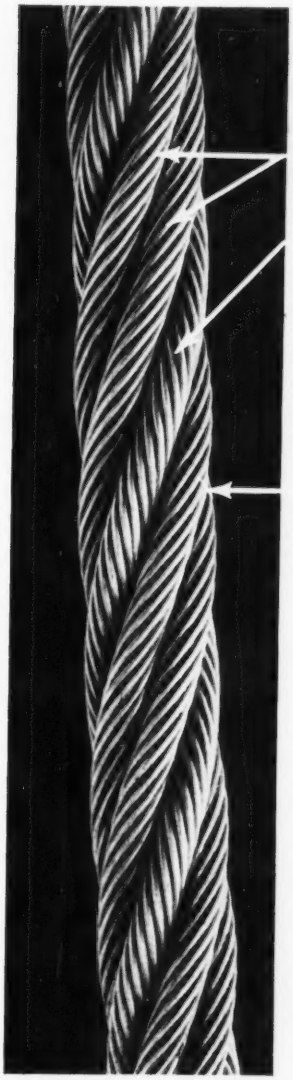
Table IV shows the results of the line brattice leakage tests. We have expressed losses here in velocity as well as volume because in many cases it is desirable to have a line brattice not only deliver the air, but to do so with enough velocity to sweep it up across the face. Measurements were made about 10 ft inside the entrance and 5 ft inside the exit of the line curtain.

It was originally planned to use the plastic as a base. Assuming it a 100% airtight material, any loss would be leakage over the curtains, which deducted from the losses obtained on the other fabric tests would give true leakage through the fabric. As is demonstrated in Table IV, this was not possible. The writer feels it would not be far off to assume the No. 7 cotton duck to be airtight at these low pressure differences. This then could be applied to the other fabrics to find approximate leakage through the fabric.

Plastic is at its best when hung as a pre-cut curtain on a sealed frame with the plastic edges sealed with nailed strips. Plans are underway to combine jute and plastic to get the best features of both.

Value Comparison

This value comparison is an attempt to show value received for brattice cloth for normal temporary stoppings and line curtains based on the initial cost of cloth only. This does not show other economic considerations, such



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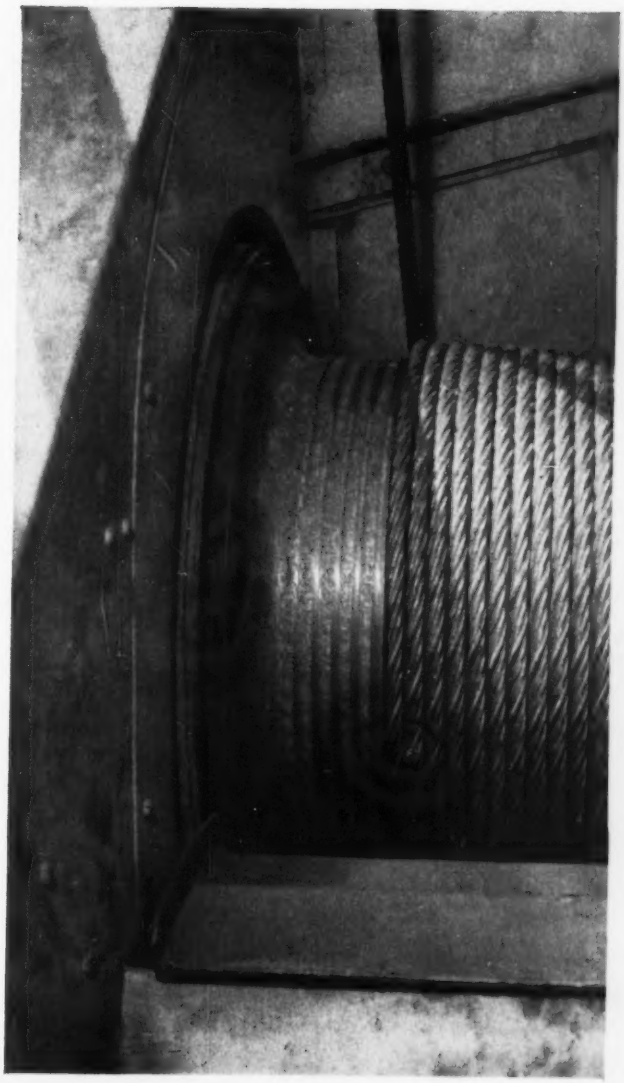

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Table I Breaking Strength

Material	Weight, oz	Yarn Counts	Warp Direction, Lb	Fill Direction, Lb
No. 3 Jute.....	10½	11 x 14	81	100
No. 1 Jute.....	14	11 x 14	96	109
D. W. Jute.....	16⅔	12 x 14[1]	189	118
No. 7 Cotton Duck	10	38 x 30[1]	131	102
No. 15 Plastic....	15[2]		77	76

[1]Double warp thread of twice count, actual effective thread in warp direction.

[2]Plastic stretches double or more before break.

Table II Leakage Through Temporary Stoppings Medium Velocity

Material Tested	Treatment	Pressure Diff., In, wg Water Gauge	Air Passing Thru Stoppings—cfm	Remarks
No. 3 Jute 10½ oz	Dry	0.04	4,880	One could feel air easily on the hand. Smoke drifted with no rise. Note difference in different treatment same wt. cloth.
No. 3 Jute 10½ oz	Standard	0.04	4,000	One could feel the air coming thru the material on the hand. Smoke drifted right along with no rise.
No. 1 Jute 14 oz	Standard	0.05+	2,960	One could feel air on the hand faintly, leakage around edges of frame and hung material was more noticeable. The smoke drifted, but also rose 5 or 6 sec in addition to drift.
Dbl. Warp 16⅔ oz	Standard	0.05+	2,700	One could feel no air coming thru on hand, no noticeable drift of smoke in front of cloth, but smoke rose for 13 sec and then drifted along roof. Most of the 2,700 cfm must have been leaking around edge of the frame.
No. 7 Cotton 10 oz	Standard	0.05+	1,640	One could feel no leakage on the hand. Smoke rose for 16 sec before it started to drift along roof. This 1,640 cfm is assumed to be nearly all leakage around frame or edges of cloth not thru material.
No. 15Y-15 ga	Plastic	0.05	3,200	The material is 100% airtight Smoke rose in 13 sec then took off along roof. This high leakage was obviously due to the fact that plastic will not fold, bunch or form well as will a woven material.

Table III Leakage Through Material High Velocity

Material	Treatment	Air Passing Thru Stoppings cfm	Remarks
No. 3 Jute 10½ oz	Dry	950	Smoke dissipated so fast one could not get an accurate measurement.
No. 3 Jute 10½ oz	Standard	880	Could feel air on hand.
No. 1 Jute 14 oz	Standard	750	Could feel air on hand faintly.
Dbl. Warp 16⅔ oz	Standard	350	Could not feel air.
No. 7 Cotton 10 oz	Standard	158	Could not feel air.
15Y Plastic 15 ga		250	Leakage around plastic on edges of frame considerable.

Table IV Line Brattice Leakage Tests*[1]

Material	Treatment	Velocity Loss, fpm	Volume Loss, cfm	Remarks
No. 3 jute 10½ oz	Dry	110	3,283	
No. 3 jute 10½ oz	Standard	94	2,796	
No. 1 jute 14 oz	Standard	55	1,619	
Dbl. warp 16⅔ oz	Standard	28	807	
No. 7 Cotton 10 oz	Standard	15	411	
15Y-15ga		40	1,169	Does not hang as smoothly as fabric nor close along top as well.

[1]Instruments not delicate enough to measure minute difference in water gauge or friction effect of air on different types of material.

Table V Temporary Stoppings Efficiency Cost Comparison, Medium Velocity

Material	% Air Loss Reduction	% Additional Cost
No. 3 Dry	—	—
No. 3 Standard	18	0
No. 1 Standard	39	26
Dbl. Warp	45	63
No. 7 Standard	66	123
No. 15Y Plastic	34	137

as labor cost, ventilation costs, costs and requirements to increase ventilation, and need for improved ventilation. These factors all vary from mine to mine, and will have to be assessed by the individual in making the final choice of brattice cloth.

Table V shows a comparison of the different types of material as used in a temporary stopping based on percent of air loss reduction as compared to percent of additional costs for material. Each is based on improvement over the least efficient cloth which is also the least costly.

Based purely on cost of basic material, the No. 1 jute, standard treatment, appears to be the most efficient for stoppings in areas with low or medium air velocity as the percent of air loss reduction is greater than the percent of additional cost. *(Continued on p. 114)*

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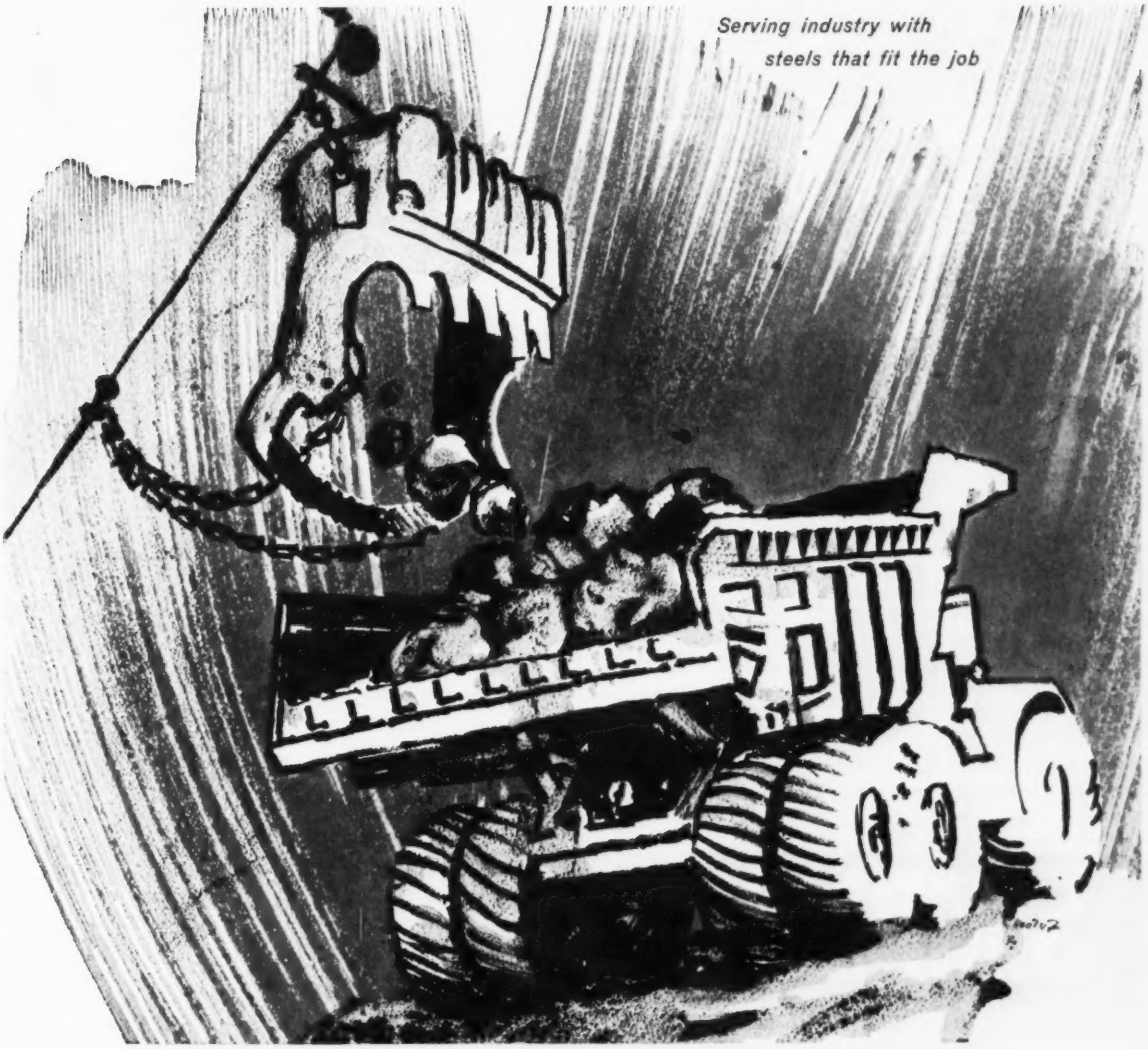

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Table VI Temporary Stoppings Efficiency Cost Comparison, Higher Velocities

Material	% Air Loss Reduction	% Additional Cost
No. 3 Dry	....	...
No. 3 Standard	7.5	0
No. 1 Standard	21.0	26
Dbl.Warp Standard	63.0	63
No. 7 Cotton Standard	83.0	123
No. 15Y-Plastic	74.0	137

Table VII Line Brattice Efficiency Cost Comparison

Material	% Air Loss Reduction, Percent	% Additional Cost, Percent
No. 3 Dry	..	...
No. 3 Standard	15	0
No. 1 Standard	50	26
Dbl. Warp-Standard	75	63
No. 7-Standard	87	123
No. 15Y-Plastic	64	137

In higher velocities, the heavier material would prove more efficient. As shown in Table VI, double-warp appears to be the break-even point.

The effect of line brattice is yet another problem. Pressures are lower than in the case of stoppings and the amount of curtain material in contact with the air is considerably higher. Air velocities were between those on the two test stoppings, or about 200 fpm entering the curtain. Table VII indicates the efficiency cost comparison of 100-ft line brattice constructed of the different materials, all other conditions being the same.

Here the double warp material appears to be the most efficient unless, of course, the operator needs the added air given by the No. 7 cotton duck. It might be cheaper to pay more for the material than it would be to do one of several other things inorder to get added air, such as provide new or additional airways, repair of door and stoppings, new fans, or cleaning out of existing airways.

Conclusions—Of the materials tested, the No. 1 jute and the double-warp materials with the standard treatment appear to be the best brattice materials for the average mine. Both give satisfactory service in the medium to high velocity ranges.

Of the two treatment processes, the standard would appear to be much superior to the dry treatment. This is exemplified by Fig. 8 which shows the difference in materials and treatment methods.

This report may serve as an aid in assisting the mine operator to select the brattice material which best suits his particular needs. However, he must remember that, regardless of the efficiency of the material used, a poorly hung brattice will not fulfill the minimum ventilation requirements of the average mine.

Acknowledgments—Field work was conducted over a 3-day period at the mine of Enoco Collieries, Inc., near Bruceville, Ind., through the cooperation of John Stachura, vice president and general manager. Mike Kensek, pillar supervisor, and Bill Gillen, ventilation engineer of Enoco Collieries; and Bob Kessler of American Brattice Cloth Corp. assisted in conducting the tests.

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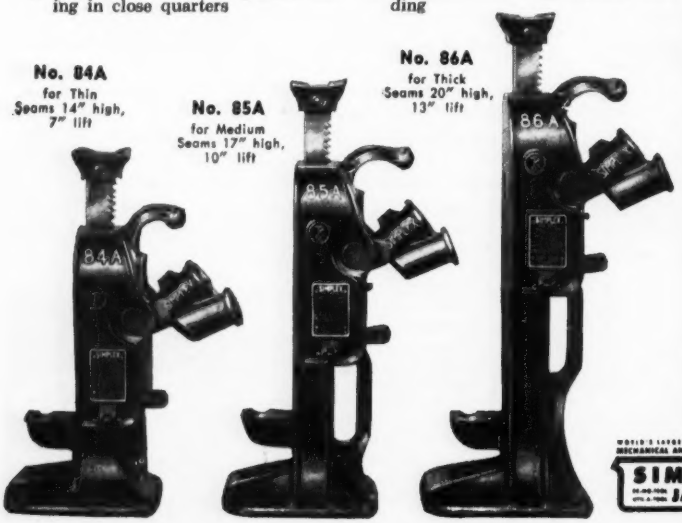

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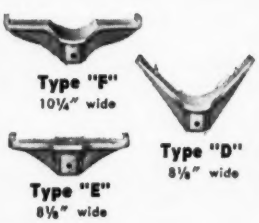

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◀ **Dick Edwards has been operating out of Rome's Pittsburgh office since 1956. An ex-Marine, he started as a factory hand, running a machine in Rome's plant, but his savvy carried him through Union College and several Rome sales offices until, in 1958, he was made manager of the Pittsburgh office. Dick is sharp—able to make intelligent recommendations for any electrical problem you're bothered with. Try him.**

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MODERN wheel mounted loaders combine speed and mobility, can handle a wide variety of jobs in many industries.

How to Choose a Wheel-Mounted Loader

Combining speed and mobility, modern wheel-mounted loaders are now highly regarded and widely used units. Here are some tips on selecting a wheel-loader, fitting it to job needs and determining true machine size.

INDUSTRIAL WHEEL-MOUNTED LOADERS in the 15 yr since World War II have moved from being little more than overgrown agricultural machines to become highly regarded and widely used pieces of heavy equipment. Combining speed and mobility, they are found not only on construction jobs but in logging camps, underground and surface mines, city and county road departments and on utility stockpiles.

With the continuing upward spiral of the costs of doing business, however, certain information recently developed by Caterpillar Tractor Co. on the factors determining wheel-loader productivity is timely food for thought.

Selecting The Wheel Loader

As with other capital goods, wheel-loaders should be purchased for their ability to produce a certain amount of work at a fairly predictable cost. To do this, selection of the most productive wheel-loader for a particular job should be based on analysis of: (1) production required; (2) productive ability of each loader under consideration; (3) purchase price in relation to machine quality; and (4) other factors, such as, parts and service availability and approximate trade-in value of the unit purchased.

Production requirements usually are known or can be figured with little trouble. Plotted on graphs in terms of yards, tons, cords or number of trucks per hour or per day, producers can chart the necessary production on an average daily, peak daily, average hourly and peak hourly basis.

Finding the wheel-loader best matching the work load is often more difficult, according to the Caterpillar studies. Loader specifications give a manufacturer's eye view and can be of some help in determining capacity of each machine on various operations. However, as suggested by Table No. 1, the 12 major domestic manufacturers of loaders have substantially different rating practices. Prospective machine buyers generally have even greater differences in interpreting these ratings. Bid specifications and equipment specification sheets are written in the same terms, but each organization has a different definition for many rating conditions.

A machine purchased in these circumstances may be too big and expensive or too light and unproductive. Buying a 3-yd loader because 12-yd trucks are loaded is seldom economical if the loader is idle 60% of the time. Difference in loading time between a 2-yd and a 3-yd loader serving a 12-yd truck is about 60 sec, less than the usual delay at a traffic light or the scale house.

Important specifications in selecting a wheel-loader are:

Loader Components

1. Bucket capacity
2. Lifting capacity
3. Bucket operating speed

Chassis Components

1. Engine power rating
2. Physical size and weight
3. Work and travel speeds

Most manufacturers rate bucket capacity by Society of Automotive Engineers (SAE) recommended practices. This is a heaped rating and is a good measure of the "average" volume of material obtained in the bucket for the "average" of many types of materials by reasonably competent operators.

Lifting capacity describes a machine's ability to pick up its load. It is a scientific measure of machine limitation and is normally expressed as a curve of capacity at various

Table No. 1—Some Brief Comparative Specifications

2- to 2½-Yd Size Class

Machine	Std. Bucket Size	Max. Hp Rating	Weight Lb	Approximate Factory Price Diesel	Gas
A	2½	130	23,300	$23,375	—
B	2¼	122	22,300	21,750	$19,200
C	2½	120	21,500	20,965	—
D	2	135	20,780	20,350	17,950
E	2¼	105	20,310	20,270	18,450
F	2	133	20,700	19,600	16,250
G	2	105	17,891	19,250	16,600
H	2	104	17,600	18,850	16,500
I	2	105	18,300	18,725	16,300
J	2	100	18,432	18,622	—

bucket heights such as in the graph.

Carrying capacity is a popular rating, apparently describing the workload possibilities of a machine. Unfortunately, the Caterpillar studies point up the fact that the term has no real meaning because it implies machine stability and operator safety while carrying a certain load. A designer cannot establish such a rating that will be valid on every job. Only an experienced operator, working a specific job, can establish carrying capacity by the feel of the machine.

Bucket operating speeds are important because sluggishness or under-capacity limits total machine productivity. Loader geometry is important to production, too, and several factors deserve brief but separate mention.

One of these is bucket reach, the distance from the most forward point of the chassis to the edge of the bucket in dump position. As shown in Table No. 2, this varies from model to model and can be critical for efficient loading into the center of truck beds.

Bucket dumping height is important if the wheel-loader purchased must load high-sided trucks. Table No. 3 shows dumping height of ten machines, measured from ground level to center of the bucket hinge pin. A shorter distance, from ground level to lower edge of the bucket, is shown in Table No. 4.

Both distances should be considered. If the bucket in dump position will clear the sides of the truck, cycle times should be faster because operators do not have to raise the bucket before backing away. Along this same line, devices such as automatic bucket positioning mechanisms on some units cut cycling time and often help a smaller wheel-loader out-class a larger one.

Chassis Components

Engine power ratings again represent a manufacturer's view expressed in his own terms. Most builders list a maximum horsepower rating to identify work potential. With naturally aspirated engines, especially gasoline models, cubic inch piston displacement is a reliable indication of an engine's ability to deliver a certain amount of power through a reasonably long service life.

With turbocharged engines, particularly diesels, piston displacement is not a good yardstick. Here, the manufacturer is obliged to rate horsepower, balancing power output against economically long, total engine life.

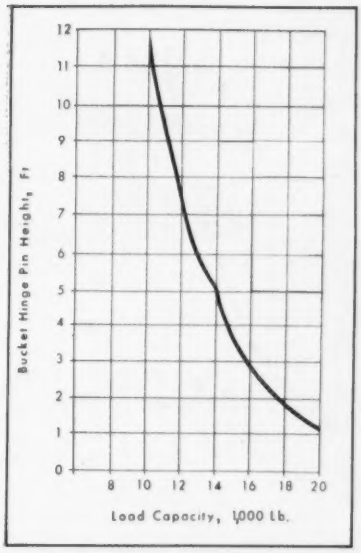
With this in mind a potential owner of a loader with either type of engine should make his own judgment on horsepower. To do this, he should compare working performance and productivity of each machine against an estimate of engine durability and operating cost based on experience or the manufacturer's reputation.

In the choice between gasoline and diesel, other factors should be considered. Briefly, gasoline engines may be lower priced, their workings may be better understood by mechanics, and their fuel more readily available.

Diesel engines have better lugging ability, require few operating adjustments, operate on low-cost fuel, often operate more hours between overhauls and often have a longer total life. They will pay their way on heavy, continuous jobs.

Determining Machine Size

True machine size is best determined by studying physical size and



HOW LIFTING CAPACITY of loader decreases as bucket height increases.

Table No. 2—Bucket Reach at 7 ft Dump Height

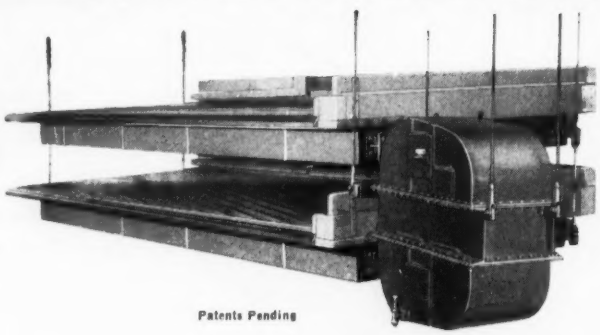
Machine A	Not available
B	32 in
C	Not available
D	50¾ in
E	40½ in
F	34½ in
G	44 in
H	Not available
I	42 in
J	51 in

Table No. 3—Dumping Height Measured to Bucket Hinge Pin

Machine A	11 ft 10 in
B	10 ft 4 in
C	Not available
D	11 ft 11¾ in
E	11 ft 7½ in
F	10 ft 2 in
G	11 ft 3 in
H	11 ft 6 in
I	10 ft 11 in
J	Not available

Table No. 4—Dumping Height Measured to Edge of Dumped Bucket

Machine A	9 ft
B	8 ft 3 in
C	Not available
D	9 ft 1½ in
E	8 ft 10 in
F	8 ft 4 in
G	9 ft
H	9 ft
I	9 ft
J	8 ft 6 in



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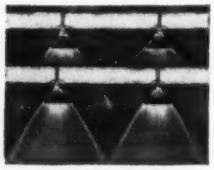

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weight rather than bucket size or lifting capability. A machine's size and weight affect operating stability and contribute more to wheel-loader productivity than many other factors. Operators tend to work a loader at its safe, comfortable capacity rather than at its peak.

Operator safety and convenience are affected by other factors, too. Loaders with lift mechanism components located ahead of the operator's compartment eliminate danger from links, arms and cylinders passing at the sides of the operator and such design allows access to the seat via steps, rather than by climbing over the lift assembly. Wheel loaders equipped with fenders are safer because they eliminate danger from rocks and dirt kicked up by the tires. Loaders with long bucket reach are safer than shorter-armed units because there is less chance of spilling material on the operator. Some units also protect operators from spillage by use of a high "spill plate" on the back edge of the bucket.

Also, physical size and weight indicate the amount of material used in construction of the loader, and more material frequently means greater durability. This, too, is something for the purchaser to evaluate because he best knows the operating pace and severity of his operation. Additionally, a skilled operator, constantly working a loader to capacity, requires a durable machine.

Roadability and operating stability should also be checked before purchase. Published specifications of many machines list top forward and reverse speeds of more than 20 mph. On a specific job with its particular conditions of footing, grades and material weights, maximum speeds may not be possible. Pitching, yawing or bouncing at any speed are dangerous to both operators and equipment. Real top speed of a unit at work or in travel is the speed at which it can be operated safely.

Based on the Caterpillar analysis of the many wheel loaders on the market, it is difficult to label one machine "better" than another because of this feature, or that component. The real cost of owning a machine comes down to the total of initial purchase price, cost of repairs, and value of production lost during downtime minus the trade-in value, and a machine that cannot do the job required is the most expensive at any purchase price.

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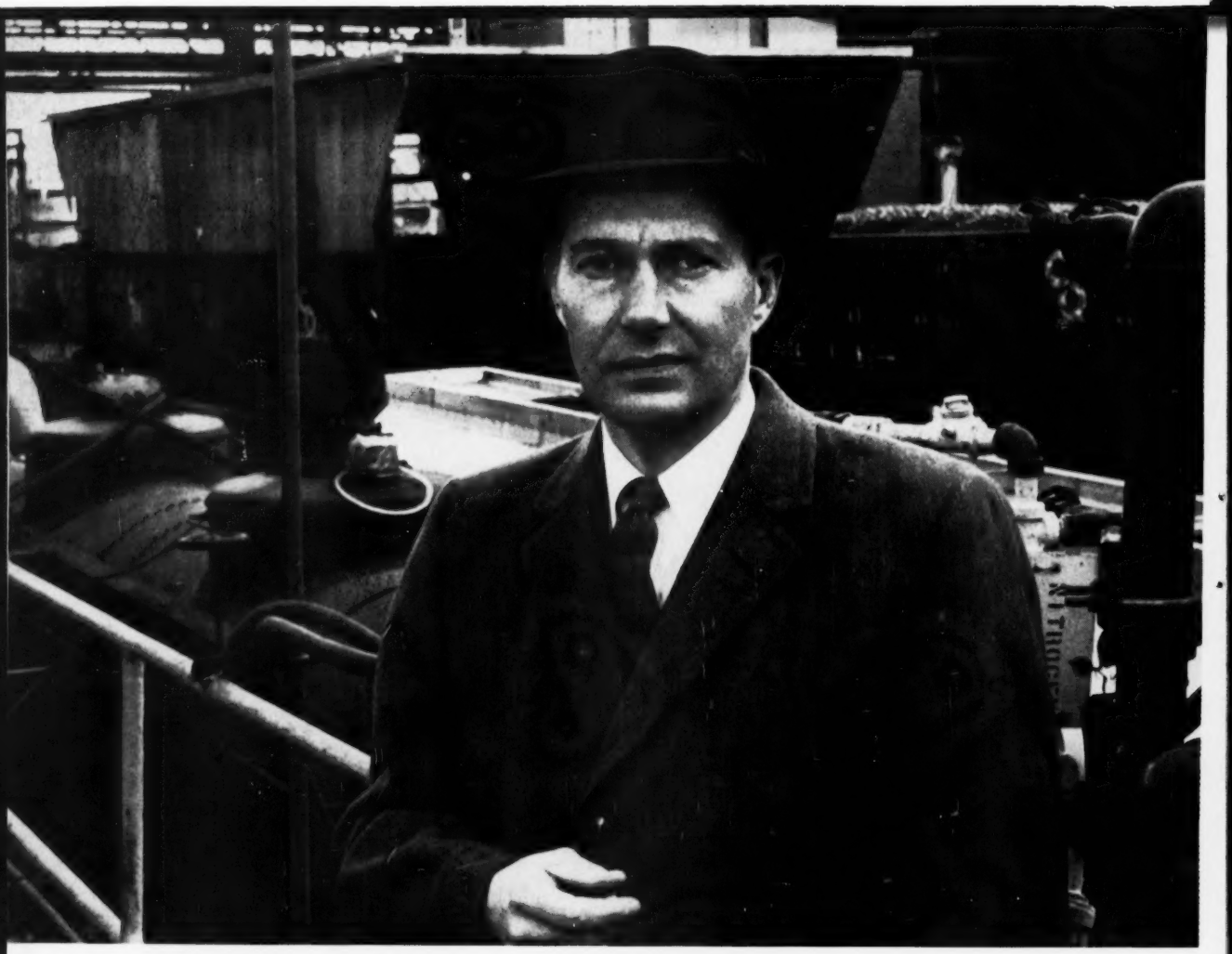
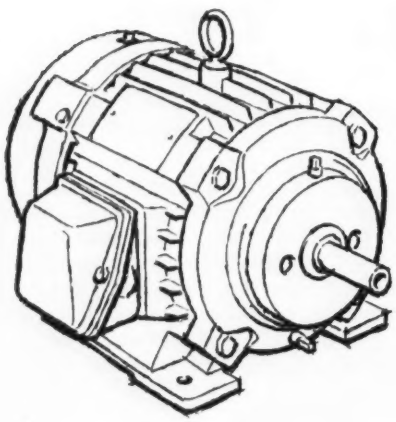


M. K. Sieber, Sales Engineer, Charleston, W. Va. District Office, Reliance Electric & Engineering Company.

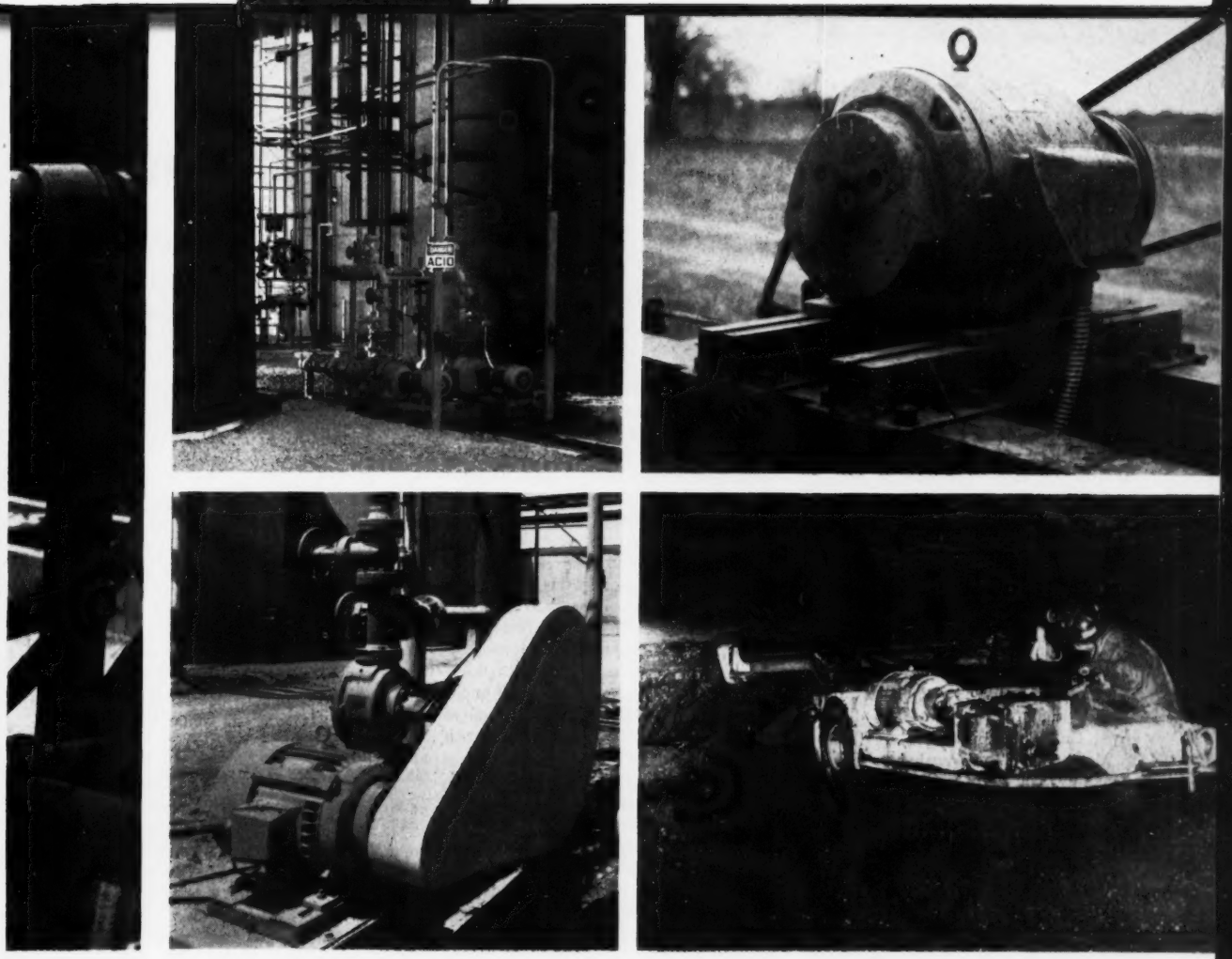
"Duty Master can handle the meanest motor job you can name.



"Every possible safeguard has been built into these totally-protected Duty Masters. They actually exceed the rigid specifications set up to protect users from corrosion, explosion, dirt or violent weather.

"In my territory, motor protection like this is pretty important, and Duty Master is living up to its reputation as a really rugged motor."

RELIANCE — Duty Master A-C. MOTOR



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Improving Efficiency in Mining,

New developments in equipment and methods for modern coal mining are highlights of Coal Division sessions at New York meeting of AIME.

HIGHER EFFICIENCY in all phases of coal production and preparation was central theme of six technical sessions on coal at the biennial New York meeting of the American Institute of Mining, Metallurgical and Petroleum Engineers at the Statler-Hilton Hotel, Feb. 15-18. Following are abstracts of technical papers presented at the gathering:

Ventilation

Ventilation in Conventional Development of Gassy Coal Seams, by Leonard Sargeant, ventilation engineer, Pocahontas Fuel Co., Div. of Consolidation Coal Co., Pocahontas, Va.

Methane in the Pocahontas field is generally confined in the coal itself, rather than in mud slips or clay veins. Therefore, the coal retains the methane until it is broken out of the solid. For this reason there is little point in developing entries around large blocks of solid coal to bleed the blocks. In fact, methane is sometimes liberated when chain pillars and barriers are finally taken.

The company has standardized ventilation practices for 5-, 6- and 7-heading development. The cycle of operations is designed so that air from a face being shot or cut is not carried back over electrical machinery, except in the case where a center heading is shot with the loader in No. 1 Heading in a 7-heading system.

The seven headings in the mains are all intakes. Parallel 5-heading entries are driven on both sides to serve as returns. Barrier pillars 150-ft thick separate the returns from the intakes to eliminate the need for maintaining lines of permanent stoppings. Submains are turned at 90 deg to the mains, and all overcasts are blocked out and the top prepared during initial development of the mains.

Brattice cloth is securely hung from header boards installed with the rib row of roof bolts. Air is brought up the tight side and posts are set at corners of the line curtain to keep trailing cables of shuttle cars from collapsing the curtains. Strict supervision of brattice installation is a feature of the Pocahontas ventilation program.

Face Ventilation in Development With Continuous Miners, by William Poundstone, superintendent, Humphrey mine, Christopher Coal Co., Osage, W. Va.

Problem of liberation of large volumes of methane was chief concern of Christopher officials when continuous mining was adopted. However, events have shown that concentration of operations in one working place is the key to success in very gassy seams.

Adequate volume of air is first necessity, and a system must be devised to provide an uninterrupted flow to every portion of working section. At Humphrey, basic plan of operations involves blocking out large areas of coal with encircling headings to bleed gas from the area prior to pillaring. Line curtains are employed to conduct air to working faces, with intake air coming up the wide side, passing over the face equipment and out behind the line curtain to the returns.

It has been found that leakage through pores in brattice cloth can be reduced by applying a very thin plastic sheeting to the pressure side of the brattice. It can be held in place by the pressure differential across the curtain. The area behind the canvas also is important in getting maximum ventilating air to the face. The equipment in use at Humphrey permits the use of larger areas behind the canvas and makes it possible to extend the curtain closer to the face.

The line curtains are supported by "sprung" roof bolts which are longer than seam height. These bowed bolts maintain the shape and area of the duct. For the past year the company has followed the practice of drilling 2-in bleeder holes in advance of the face in headings adjacent to virgin coal. This bleeds methane from the solid directly into the returns, thus improving section conditions.

Efficient Pillar Extraction Using Exhaust Ventilation, by Lonnie D. Ellison, chief mining engineer, Island Creek Coal Co., Holden, W. Va.

In pillaring operations at a gassy mine where the exhaust system of ventilation is employed, some coal must be sacrificed in the pillars that are left to insure open bleeder headings along gob lines.

In development work, air is carried up center headings, split at the face and carried back through the outer headings. The mine produces about 12 million cfm of methane per day. It is ventilated by three 8-ft exhaust fans on 18-ft-diameter shafts. Operating at water gages up to 6.2 in, the three fans produce approximately 1,500,000 cfm. A close check is maintained on methane concentrations at the face and equipment is stopped if ever the concentration reaches 1%. Wood stoppings, doors and check curtains direct air along pillar lines and regulators determine quantities to the back of the pillar line and into bleeders.

Pillaring Using Pressure Ventilation and Large-Diameter Boreholes, by David C. Ridenour, general superintendent, Olga Coal Co., Coalwood, W. Va.

Several advantages of the pressure system are:

1. Dust-laden air from underground dumping station can be directed up hoist shaft and out of mine without additional equipment.
2. Hoisting shafts are not intake shafts, thus do not freeze in winter.
3. In outcrop mines any holes to the surface, whether planned or unplanned, will serve as exhaust openings, thus eliminating long return circuits.
4. Accumulations of methane in gob areas can be effectively prevented by the addition of boreholes.
5. Large-diameter boreholes, strategically located, can act as return shafts and reduce the traveling distance of the return air current, thus reducing the number of return entries required or reducing the water gage or both.

These benefits have accrued at Olga Nos. 1 and 2 mines where faults or wants isolate long fingers of coal. One such section at Olga No. 1 is 1¾ mi long and as narrow as 1,500 ft at some points. A 36-in borehole was drilled 733 ft deep to provide adequate ventilation for pillaring this area. High percentage recovery also is possible.

At Olga No. 2 a 48-in hole has been drilled to a depth of 975 ft to a low part of the mine. Migrating drainage collects at the foot of this hole and is removed by a deepwell pump with motor on the surface.

INDUSTRY MEETING—
A Special COAL AGE
Staff-Written Report

Preparation, Safety

Coal Preparation

Solving the Flocculation Problem, by M. P. Corriveau, preparation engineer, Clinchfield Coal Co., Div. of The Pittston Co., Dante, Va. and H. P. Coil, district sales engineer, Dowell Div., Dow Chemical Co., Marietta, Ohio.

At the Clinchfield Coal Co.'s Moss No. 2 and Moss No. 3 preparation plants, satisfactory clarification of the circulating "black" water for reuse was made possible by using Dow Chemical's Separan AP30. Ferrous sulphate was an additional requirement at Moss No. 2. The changeover to AP30 effected substantial savings both in manpower and reagent costs.

Separan AP30 is not a cheap chemical and care must be taken to obtain the maximum benefit from its use. Because of the rapidity with which the flocs form and their unusually great size, it is not desirable to add the Separan too far back in the plant, as shearing forces will prevail in the usually turbulent influent to the thickener center well. At Clinchfield's Moss plants this is done through a twin-forked semicircular manifold directly over the annular trough at the discharge end of the effluent flume. Each side of the fork has three cross-pipes with ¼-in holes through which the solution is fed.

Reagent consumption is controlled by frequent testing. Determination of the settling rate is done by catching samples of the influent water in half-gallon jars, after addition of the Separan, and measuring the distance in inches settled in 1 min. This value multiplied by five gives the settling rate in feet per hour. Through experience, a settling rate at the center well of 30 to 35 feet per hour has resulted in clear overflows. The feed rate necessary to give the desired settling rate is obtained by adjusting valves in the feed lines. Such flexibility is needed because of the changing solids content in the thickener influent.

Substantial economies have been realized with the adaption of Separan AP30. The best way to show this is by tabulating the data as follows:

Plant	Reagent	Consumption, Solids Basis	Cost per Ton Filter Cake
Moss No. 2	NP10	37 ppm	$0.0999
(previous)	Alum	3.18 lb/ton	0.0731
			$0.1730
Moss No. 2	AP30	21 ppm	0.0560
(present)	Fe SO_4	1.67 lb/ton	0.0209
			$0.0769
Moss No. 3	AP30	24 ppm	$0.0650

Panelists commenting on the fine-coal recovery problem included: W. L. McMorris, U. S. Steel Corp.; David Springston, Western Machinery Co.; R. L. Llewellyn, Eastern Gas & Fuel Assoc.; H. B. Charmbury, Pennsylvania State University; and C. T. Beardsley, Denver Equipment Co.

High Head Slurry Pumping, by W. D. Haentjens, president, Barrett, Haentjens & Co., Hazleton, Pa.

Some of the earliest pumping of solids was done by the coal industry and this practice is now being carried out by many other industries. Pumping of fines is very common and transporting of coarse material by pipeline is gaining.

Among the key points to keep in mind when designing a solids-pumping system are: keeping a constant-level sump; prevention of solids settling; uniform feed to the sump; maximum permissible solids-to-water ratio; size distribution of solids; desirability of adding fines if none are present; pipeline grade; possibility of hammer; provisions for draining the system in event of power failure; proper seal-water facilities; and variable-speed control to provide for changes in feed.

Economic factors to consider in solids pumping are: pipewall thickness; use of an inhibitor to prevent internal corrosion; coating or wrapping pipe exterior; cost and availability of water; water disposal at the end of the line; amortization and operating expense; and comparative cost to railroad or truck transportation.

Performance of Dense-Medium Cyclones on Fine Coal, by M. R. Geer, M. Sokaski, P. S. Jacobsen and H. F. Yancey, U. S. Bureau of Mines, Seattle, Wash.

Result of tests on various ¼x0 coals at the USBM test facility show that the dense-medium cyclone is capable of making a sharp separation and is of particular value in difficult cleaning.

Typical test data on Utah coal are as follows: feed ash, 13.6%; clean coal ash, 4.9%; refuse ash, 52.3%; yield, washed coal, 81.7%; efficiency, 99.9%; ±0.10%, 17; specific gracity of separation, 1.43; error area, 17.

Typical test data on Washington Wilkensen No. 2 coal are as follows: feed ash, 25.5%; clean coal ash, 11.3%; refuse ash, 43.3%; yield, washed coal, 55.7%; efficiency, 92.3%; ±0.10%, 44; specific gravity of separation, 1.45; error area, 27.

New and Novel

Mechanized Tamping of Mine Haulage Roads, by D. H. Davis, assistant to vice president—operations, Consolidation Coal Co., Pittsburgh, Pa.

Underground construction work of all kinds has too often been performed by inefficient manual methods, a situation that is true in trackwork. Steps were taken at Mathies mine about 15 yr ago to introduce efficiency into the handling of ballast for a high-speed, heavy-iron main haulage track. The first step was the drilling of a 20-in borehole through which ballast could be fed into the mine from a storage bin on the surface. This was followed by the introduction of high-capacity ballast cars, as the distance from the borehole increased. Most recent step is the introduction of a mechanized ballast tamper which grades the track and consolidates the blast-furnace-slag ballast under the ties.

The Fletcher track tamper, Model TTA, consists of a self-propelled truck equipped with the tamping mechanism and hydraulic track jacks and a trailing truck on which the compressor is mounted. The tamping vibrators are mounted on a slide similar to the slide on a Fletcher roof drill. All controls are centrally located and the entire operation is under the control of one man. The tamping action is powered by compressed air, but all other motions, including jacking and track clamping are hydraulically powered.

Formerly five men aligned and tamped 100 ft of track per shift, as compared with 418 ft of track per shift now aligned and tamped by the two-man crew of the mechanized unit. Adding another man to the crew to help with alignment would mean an addition of 144 ft of track aligned and tamped per shift.

Also in use at Mathies is a new track-welding development, the Thermit "Self-Preheat" process. This is a simplified, economical welding procedure that eliminates the need for oil-fired torches to preheat joints to be welded.

Tube Furnace Method for Rapid Determination of Sulfur in Coal, by G. Dale Coe, Research Engineer, and G.E. Keller, manager—coal evaluation, U. S. Steel Corp., Pittsburgh, Pa.

Determination of sulfur in a sample in 5 min without sacrificing accuracy is the major advantage of the tube-furnace method in use at Robena laboratory. The sample is burned 4 min in oxygen at a temperature of 2,400 F. Products of combustion, collected in a beaker of 1% hydrogen peroxide solution, are titrated to a yellow end point, using a methyl red indicator with 0.05 normal sodium hydroxide. Critical factors are

the temperature of combustion, weight of sample (0.5 gr) and standardization of the titration solution.

The method has limitations and should not be used indiscriminately. Research to date has shown that coals containing appreciable amounts of chlorine or calcium compounds may not be amenable to analysis by the tube-furnace method. Research in these areas is continuing in the hope of establishing correction procedures for coals containing the interfering elements.

Continuous and Automatic Measurement of Moisture in Coal by Capacitance, by Loy A. Updegraff, project engineer, Bituminous Coal Research, Inc., Columbus, Ohio.

This method of continuously measuring moisture content in a stream of free-flowing solids has been in use in the food industries for some time. In applying the method to coal, the dielectric of the capacitor is the stream of coal in which the moisture is to be measured. One of the conductors is a test cell rigidly embedded in the stream of coal on a conveyor, and the other conductor is a parallel plate which may be placed under a belt conveyor or in the bottom of an apron conveyor, say. The plates are connected through a bridge circuit to a recording pen, or possibly to a control circuit in a drying system. Changes in the moisture content of the coal create unbalance in the bridge circuit, and this situation can be employed to operate a recording device or other controls through a servomechanism.

Outstanding features of the system are low first cost, low maintenance cost, low supervision requirements and installation with a minimum of alterations.

Degasification of Coal Seams by Horizontal and Vertical Drilling, by G. R. Spindler, dean, School of Mines, West Virginia University, and William N. Poundstone, superintendent, Humphrey mine, Christopher Coal Co., Morgantown, W. Va.

Extensive tests and observation of degasification holes in northern West Virginia's Pittsburgh seam indicate the following:

1. Total gas volumes involved in the mining of normal daily tonnages are large; therefore the removal of relatively small quantities through boreholes permits of few modifications in present ventilation practices.

2. Drainage surfaces of either horizontal or vertical holes exhibit characteristics similar or identical to those created by the extraction of coal by mining.

3. Drainage channels in the coal bed are principally through open cleavage planes or other fissures, and the occurrences and extent of such drainage channels are related to geologic distortion following development of the seam.

4. Horizontal drilling in advance of mining appears to offer the most promising prospect, but effective and extensive application will depend upon the ability to drill long holes, possibly 1,000 or 2,000 ft, with reasonably precise directional control and at reasonable cost.

5. Water infusion appears to offer some good prospects as an aid to degasification and in the control of gas-liberation rates.

Drilling Large-Diameter Boreholes, by Victor Zeni, Zeni-McKinney-Williams Corp., Morgantown, W. Va.

Drilling of large-diameter boreholes offers an economical way to provide additional airshafts, escapeways and manshafts. Continuing development of tools indicates that 120-in holes are feasible at costs below those normally expected in conventional shaft sinking.

Studies are now being conducted in the possibilities of lining drilled shafts with precast concrete pipe, although in the normal case the drilled shaft requires a minimum of treatment upon completion. Several types of drilling heads are used, including calyx-with-shot and roller-cone types.

Hydraulic Mining of Coal, by J. J. Dowd and J. J. Wallace, U. S. Bureau of Mines, Pittsburgh, Pa.

Presentation included 19-min silent motion picture of experimental methods now in use near Indiana, Pa., to mine the Pittsburgh seam with a high-pressure stream of water.

Water from supply reservoir on surface is pressurized by a multistage pump driven by 900-hp diesel engine. Underground equipment consists of movable monitor for aiming 4,000-psi jet at coal face. Undercut 8 ft deep and about 14 in high is made across face, a shear cut is made along one rib and remainder of face then is slabbed off.

One possibility for the future is to mount monitor on loading machine to permit immediate pickup of coal to prevent recirculation and consequent degradation.

Coal Handling

Crushing of Anthracite For The Reduction of Domestic to Steam Sizes, by P. D. Rao, graduate assistant; H. B. Charmbury, professor and head, Dept. of Mineral Preparation; and D. R. Mitchell, professor and chairman, Division of Mineral Engineering, Pennsylvania State University, University Park, Pa.

The market pattern for anthracite coal has changed considerably in recent years. The demand for domestic sizes has been gradually decreasing and the demand for steam sizes has been increasing. The companies however aim for maximum production of domestic sizes since these products command premium prices. To meet the market demands, particularly in certain periods of the year, further size reduction of the coarse clean coal is necessary. The present practice of multistage crushing in toothed rolls leads to complicated flow arrangements and is costly.

Data obtained from a series of tests indicated that crushers with high reduction ratios could be used with a resulting simplification of crushing flows and appreciable reduction of capital expenditures and operating costs. The different types of crushing units studied included the rotary-type breaker, jaw crusher, impact-type crusher and the aerofall mill in which air removes undersize.

Influence and Application of Rope Sideframe Belt Conveyors to Surface Coal Handling Facilities and Preparation Plant Design, by E. Morgan Massey, president, Massey Coal Co., Omar, W. Va.

Rather than attempt to place all of the storage, preparation and loading facilities in a building labeled coal preparation plant and located on the railroad, it was decided to locate each of the components at natural points along the route between the seam level and the railroad 1,400 ft below. The plan called for taking advantage of gravity wherever possible and the more ideal locations for hillside coal storage bins; location of refuse piles; and plant sites with good rock subsurface eliminating costly concrete foundations for the heavy preparation machinery. Inasmuch as wire rope sideframe belt conveyors have proved to represent a great saving over rigid belt structure in underground costs, it was decided to connect these facilities together wherever possible with rope sideframe units, both inside and outside of the preparation plant, taking full advantage of their features.

The use of the rope sideframe conveyors throughout the system, and to a lesser extent the use of decline chain conveyors where the grades were too great for rope sideframe belts, represented quite a saving over any other system that could be devised for material handling. By comparison with the rigid-type belt a substantial saving is evident, based on the cost for instance, of the overland conveyor that feeds the cleaning plant—a 36-in rope unit, 700 ft long, powered by a 30-hp motor and mounted on mud sills. With this unit, walkways, structural steel supporting members and extensive grading are eliminated. Cost in place was about $75 per foot. A rigid belt gallery for the same purpose would have been more expensive by $26.25 per foot.

Maintenance

Daily Maintenance and Complete Overhaul of Continuous Miners, Joseph Mason, maintenance engineer, Mountaineer Coal Co., Fairmont, W. Va.

"The primary objective in a continuous-miner maintenance program is to get maximum yield through maximum running time. The miner, although complex, is well built and is a reliable producer when given the proper care. Undoubtedly, one of the weakest links in production of coal from continuous miners is machine maintenance. Concentration of production into a single machine amplifies the effect of unit outage.

"The cost of a continuous miner makes it impractical to keep spare miners on hand to substitute for one that is down. Success or failure in maintenance will be a measure of success or failure of the operation. The time has come when maintenance is no longer something of a stepchild of the industry. It must be put in its rightful place, on an equal level with production. Unless we are prepared to recognize the problems of maintenance, the continuous mining machine will fail to accomplish its purpose.

"Everyone in the coal industry knows the importance of operating continuous miners at their rated capacity as much of the time as possible. The potential capacity of the miner is such that 1 min delay means from 3 to 8 tons of coal lost. As the machine becomes more complex, the problem of maintenance becomes more acute."

Since "good maintenace begins with good design," the Mountaineer Coal Co. is in constant consultation with equipment manufacturers. Design weakness, performance aspects and other problems, such as, inspecting and reporting, daily repairs and overhaul schedules were discussed by Mr. Mason.

Selecting the Proper Type of Continuous Miner, John A. Stachura, vice president, Enoco Collieries, Inc., Bruceville, Ind.

"In most mining operations there is tremendous incentive to undertake the continuous-mining program. It can reduce the size of the mine greatly by permitting a minimum of working places. It makes pillar recovery work more efficient from the standpoint of over-all cost, amount of coal recovered and safety. The work force can be reduced materially, permitting closer and more efficient supervision. It simplifies maintenance because equipment can be more readily standardized."

One of the major reasons why operators have not changed to a continuous-miner program has been seam characteristics. Related problems have forced equipment manufacturers to redesign machines to cope with difficult mining conditions. Manufacturers have made numerous changes in machines to suit conditions where equipment will operate. These changes include, among others, the following:

1. More rugged construction.
2. Additional horsepower.
3. New bit designs.
4. Lower machines for thin seams.
5. Improved maintenance.

In addition to selecting the proper machine it is equally important to select proper men for the units as well as selecting proper supervisory personnel. It is a fact that to make continuous mining successful requires more accurate management, more interested machine operators, good maintenance crews and a close study of all phases of the operation. Poor judgement or lack of aggressiveness on the part of the continuous miner can easily result in a 25% to 35% reduction in output.

Materials Handling

Moss No. 3 Mine—Materials Handling Aspects, F. M. Morris, chief engineer, Clinchfield Coal Co., Div. of Pittston Co., Dante, Va.

"From a materials handling viewpoint the Moss No. 3 operation is principally of interest as an ensemble. Generally speaking it uses time tested equipment and ideas but some of these are employed on a scale that may be new in the industry. We are presently handling about 20,000 tons of raw coal per day. We expect to increase this to 40,000 tons as soon as business conditions justify it."

For coal transportation at the mine, Moss No. 3 uses 48-in rope-frame belt conveyors for main-line haulage. These belts discharge at a two-track loading point and then into railroad cars.

All production units load onto 36-in rope-frame belt conveyors whether working in lateral panels or advancing main entries. The initial idea was to plan for track haulage and large mine cars. A combination of coal contours and limited mining rights made track haulage out of the question since mainline grade would have been 6%.

Transportation from mines to plant is handled by four train crews. Each crew consists of six men with four diesel units and a caboose. Incoming loads are placed on one of six tracks. The storage yard has a capacity of 320 cars. Another crew assists in dumping the coal. The conveying system into the plant consists of a double reciprocating feeder under the dumper bin, crusher feed belt, crusher, a short impact and accelerating belt under the crusher, a suspended moving-belt type magnetic separator and a surge-bin feed belt which discharges into a 2,500-ton concrete surge bin. This feed belt was designed to move coal at 2,200 tph for the 40 to 50 min per hour coal is being dumped. The feeders under the surge bin and the belt were designed for 1,500 tph plant feed.

The refuse disposal system has a nominal capacity of 615 tph and uses 36-in belts traveling at 450 fpm. If necessary, it can be made to carry 900 tph.

Management

Communications Challenge of Automation, J. E. Osmanski, Island Creek Coal Co.

Foresight, forbearance, common sense and a large degree of mutual trust must be exercised by management and labor to keep the price of automation at a low enough level so that all society can gain from the new abundance.

There are no ready made answers to problems generated by accelerated technological change. With the full cooperation of management, unions and community groups, however, the challenge posed by automation to communicate to employees methods of meeting the problems of dislocation, relocation, unemployment, etc., can be met without neutralizing the cost reductions gained with expensive employee benefits negotiated as cushions to the problem of this change.

Foremen's Incentive Plan, Arthur E. Belton, Mountaineer Coal Co.

Because of the inherent nature of mining, the foreman exercises more direct and effective control over cost than anyone in management. It is the foreman who is in direct control of the men, machines and materials. If a company is to be a leader in the field and meet competition, all three of these resources must be used efficiently. Therefore, the most effective control is exercised at the working level.

A good industrial engineering program with a foreman's incentive plan is not the result of main-office, far-fetched ideas, fancy charts, forms or formulas. It cannot be ordered into existence as a repair part. The whole system must have adequate meaning and an objective for the people who must work with it. The local mine management must be "sold" on the entire program if it is to prove successful. Threfore, it is imperative that the industrial engineer work very closely with local mine management.

Since no capital investment is required for an industrial engineering program, the potential savings can be a strong inducement for the mining industry to use this tool. The foreman's incentive plan is actually a tool to as-

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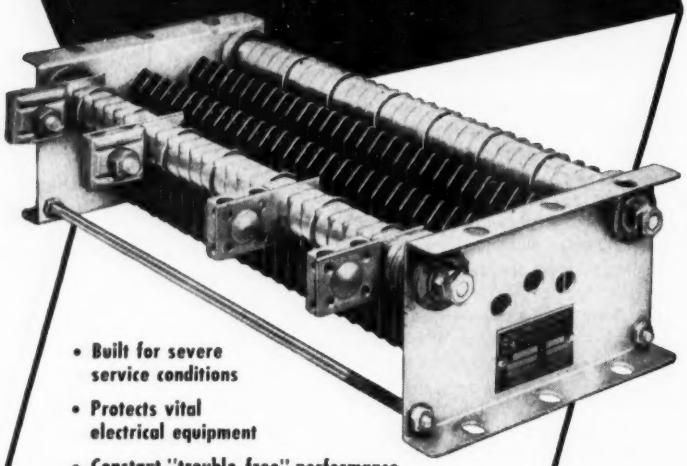

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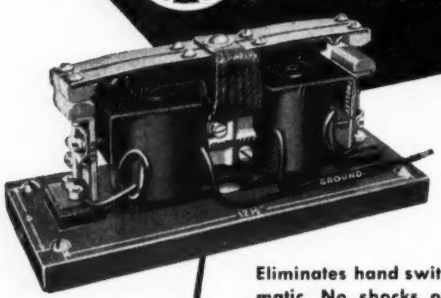

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sist top management to perform its job with a high degree of efficiency. However, no tool can achieve its intended purpose unless it is skillfully used.

Acid Drainage

A Field Study in Acid Mine Drainage, J. Richard Lucas, Mining Engineering Div., Ohio State University.

A field testing program at the McDaniels Mine, Vinton County, southwestern Ohio, has demonstrated the feasibility of reducing acid formation in a drift mine by air sealing and flooding.

To reduce water seepage under and around a mine seal, it will be necessary to incorporate special designs for seals above the water table. In our experiment, over one-half of the exposed interior mine area was covered by the mine water, and the oxygen content of the mine atmosphere dropped over one-half to 10%. Therefore, a reasonable air seal and water seal of a drift mine is possible.

From the sampling of the mine effluent during water flooding, there were indications during the relatively short test period that acid formation can be reduced by this principle. Additional work is suggested with the present seal, incorporating minor design changes, to determine the ultimate rate of acid formation over an extended period of time. Also of importance is the rate of acid formation as a function of the distribution of sulphur burden in the coal seam. After the tests have been completed on the present test mine and seal with satisfactory conclusions, the next step would be to apply the knowledge to the sealing of a considerably larger acid-producing drift mine.

Utilization

The Exploration and Mining of Raw Materials — Production of Refractory Products—Application for the Utilization of Coal, O. W. Kamper, Harbison-Walker Refractories Co.

The kind and quality of coal used in coal-fired furnaces determines to a considerable extent the type of refractories used and the service given by refractories.

The realm of refractory raw materials is very extensive and continues to grow because of the endeavor to find better raw materials from which to produce better products for refractory service.

Refractories are non-metallic products so resistant to melting at very high temperatures that they can be used for building or lining furnaces of all kinds. They are made from a wide variety of materials, of which fire clay and quartzite are used in the largest quantities. Among other refractory raw materials are magnesite, chrome, diaspore, bauxite, kyanite, sillimanite, olvine zircon.

Resist or Yield . . . WHICH IS BETTER WHEN THE PRESSURE'S ON?

In heavy or shifting ground, a mine opening always needs some form of support to give the overburden a chance to settle naturally into a pressure arch. Mining men have found that the best type of support is one which will yield slowly to the pressures until the natural arch is formed; rigid sets simply cannot resist the dynamic forces indefinitely.

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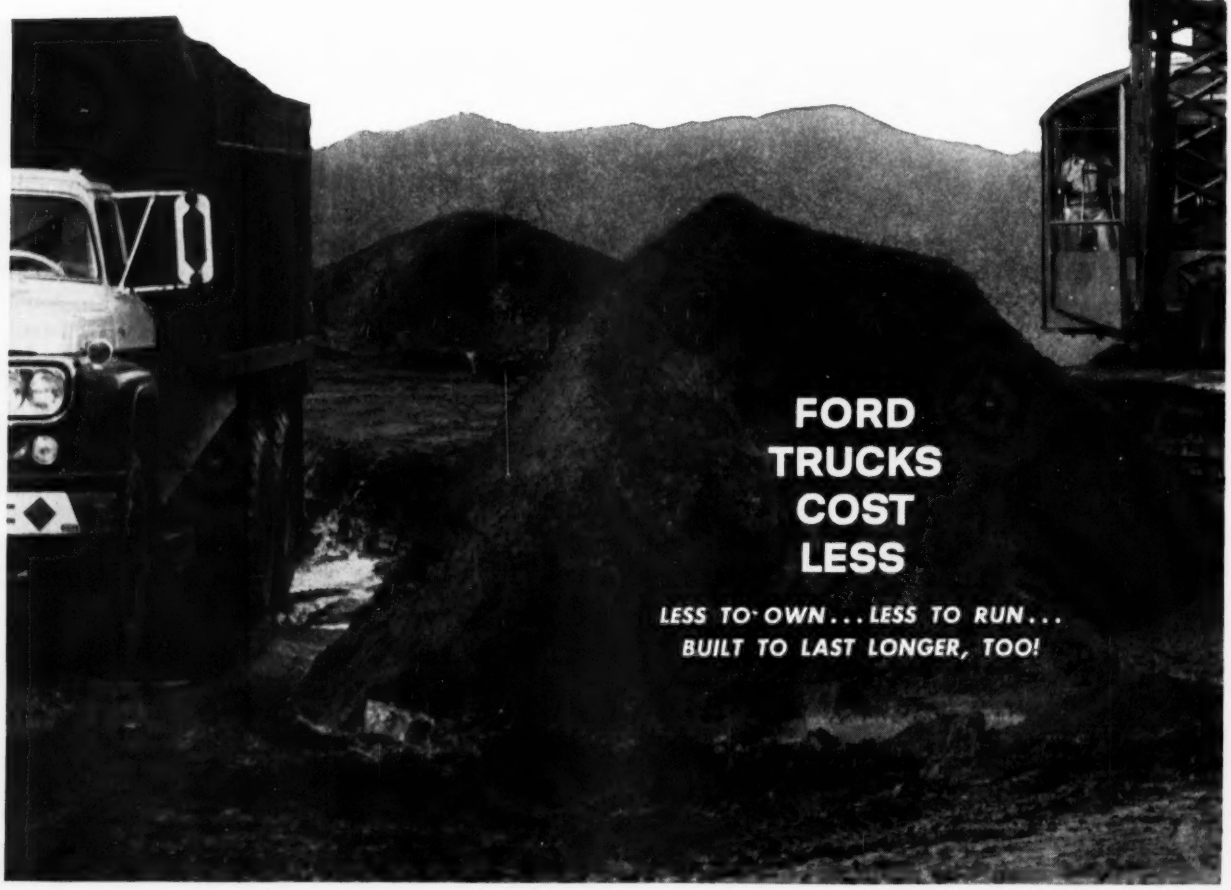

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Foremen's Forum

Citizenship and the Supervisor

Where are we headed?
What are the obstacles?
What can you and I do?

THOUGHTFUL LEADERS in America have voiced increasing concern about drifts in our national attitudes. We assume that you, too, have read or heard expressions of dismay at the numbers of our people who really believe that it is possible to get something for nothing, that if we "let George do it" our national mission will be accomplished with little inconvenience to us, that money is the basic gage of happiness and success.

These attitudes, combined with the international pressures we face, create for us an ominous situation. In his remarks on the recent occasion of the 50th Anniversary of the McGraw-Hill Book Co., John W. Gardner, president, Carnegie Corporation of New York, observed as follows:

"The world we are entering will place tremendous demands upon us—as individuals and as a nation. It will require a level of competence that we cannot now boast, a purposefulness which we possess at best fitfully, and a wisdom that we can only pray for.

"A famous physicist is said to have defined an optimist as 'someone who still believes that the future is uncertain.' This comment, though grimmer than most, is reasonably representative of the intimations of disaster which haunt the minds of well-informed Americans. But one of the odd facts about our moment in history is that though we see terrifying possibilities, few of us are sufficiently terrified to alter the day's routine. It is not the first time in history that men have been seized with languor as they approached their own possible destruction. But surely history offers no more vivid example of the way in which fear and lethargy can live side by side. We live in a state of listless apprehension, seeing the dangers, knowing the consequences, but walking somnambulistically through 'business as usual.'"

This is indeed a sobering view. The challenge demands a response, Mr. Gardner's response being a "strategy of freedom," a five-point program which points a way. The five ingredients of his strategy of fredom are:

1. Education—Immensely intensified emphasis upon individual fulfillment in our society is vitally important. Lifelong learning, through our educational system and adult education, must be encouraged. The various kinds of excellence of which humans are capable must be emphasized and individuals must be helped to seek and find these excellences. Every aspect of our educational system must be strengthened.

2. Adaptability—Potentialities for creativeness, intensiveness, flexibility and adaptiveness are infinitely greater in a free society than in any other kind of society. In a rapidly changing world these are precious attributes that may have much to do with our survival. But even these can be smothered under the dead weight of custom, inertia, red tape and vested interest.

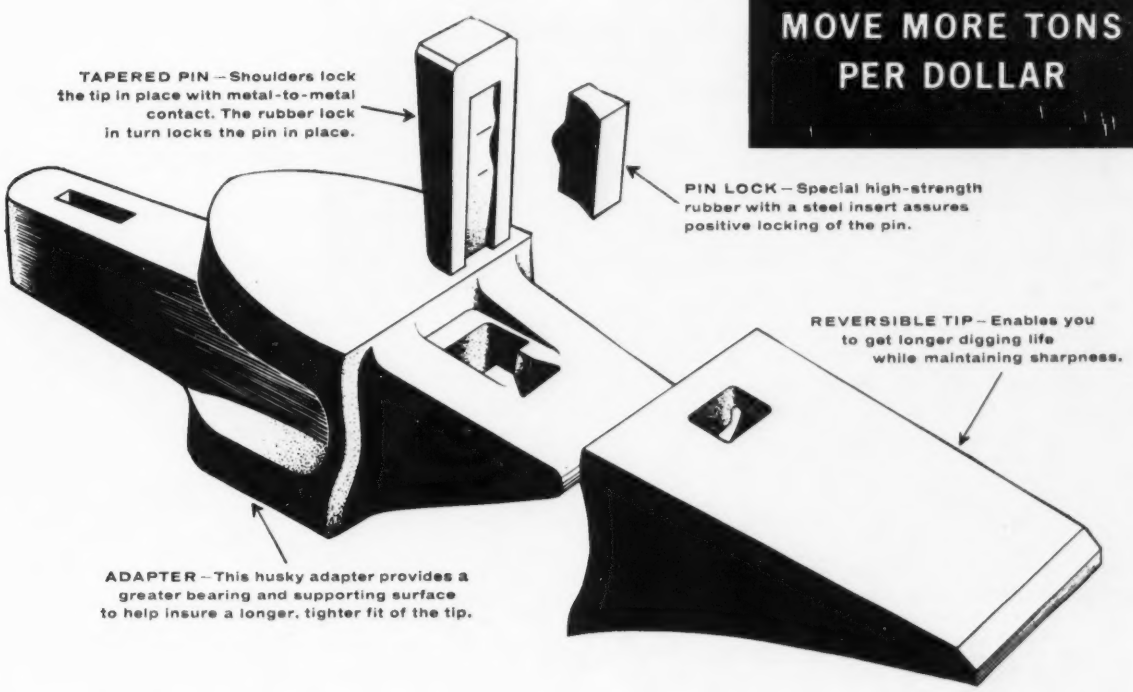
3. Pursuit of excellence—Innumerable invitations to mediocrity exist in our kind of society. These demand powerful counterpressures. Those who are most deeply devoted to a democratic society are precisely the ones who must insist upon excellence, who must insist that free men are capable of the highest standards of performance and that a free society can be a great society in the richest sense of that phrase.

4. Organization—It is futile to hope that the movement toward the more intricate organization of human affairs will reverse itself. Many of the things our society must accomplish can only be accomplished through such organization. Our task is to insure that the organizations—corporations, labor unions, government bureaus and so on—will take forms that preserve individual freedom.

5. Dedication—Final ingredient in the strategy of freedom is dedication. No great thing is accomplished without devotion. The preservation of a free society, the enrichment of a system of values upon which freedom depends, the building of a great civilization—these things cannot be accomplished by listless men. We shall need all of the devotion, all of the commitment, all of the moral purpose that lies in us.

Mr. Gardner's strategy of freedom lays down a big order. The signs of

AMSCO HELPS YOU MOVE MORE TONS PER DOLLAR


TAPERED PIN – Shoulders lock the tip in place with metal-to-metal contact. The rubber lock in turn locks the pin in place.
PIN LOCK – Special high-strength rubber with a steel insert assures positive locking of the pin.
REVERSIBLE TIP – Enables you to get longer digging life while maintaining sharpness.
ADAPTER – This husky adapter provides a greater bearing and supporting surface to help insure a longer, tighter fit of the tip.

AMSCO CAST MANGANESE STEEL DIPPERS *Installed as original equipment on many leading makes of power shovels. Cast of manganese steel—"the toughest steel known"—a material which provides as much as a ten-to-one advantage in lasting power over other steels, under the abuse of severe impact and abrasion. Sizes from ¾ cu. yd. to 9 cu. yd. capacity.*

AMSCO HARDFACING FOR BUILD-UP AND REPAIR—*Add extra service life at low cost to dippers, dipper teeth, hammers, augers, etc. . . . with Amsco Hardfacing. Complete line of hardfacing electrodes available through your Amsco welding distributor. Or write us for condensed catalog and price list on "Amsco Hardfacing Alloys".*

AMSCO SIMPLEX 2-Part Dipper Tooth extends digging life stays sharp • easy to replace*

Now you can save hours of costly shovel downtime . . . by using this new Amsco Simplex 2-Part Tooth. Simplex tips are quickly reversible to give added tip life while retaining sharpness. And when teeth eventually become worn, just knock out the retaining pin and replace with a new tip.

Simplex adapters fit this new 2-part tooth to *any* Amsco dipper or backhoe. And because Amsco makes both dippers and dipper teeth, you can be sure of proper fit between the adapter and shovel lips.

Cast of a new alloy especially developed for this service, the Amsco Simplex design is backed by over 50 years of experience in producing dippers and dipper teeth for the most rugged digging conditions.

Ask your power shovel distributor to supply you with these extra-long-wearing Simplex 2-part teeth . . . now!

WRITE US for complete descriptive bulletin on Amsco Simplex teeth, giving information on sizes and types available. *Patent No. 2,904,908

AMERICAN Brake Shoe COMPANY **AMSCO**

American Manganese Steel Division • Chicago Heights, Ill.

Other Plants in: Denver • Los Angeles • New Castle, Dela. • Oakland, California • St. Louis

In Canada: Joliette Steel and Manitoba Steel Foundry Divisions

Welding products distributed by Canadian Liquid Air Co., Ltd.

Your Test on Public Affairs

Part One (Check one)

1 Do you know the names and party affiliations of the United States Senators for your state? (Yes) (No)

2 Do you know the name and party affiliation of the United States Representative for your Congressional District? (Yes) (No)

3 Do you know how each of your Congressmen stands on such basic issues as taxation, government economy, public power, labor-management relations, states' rights? (Yes) (No)

4 Have you written or talked with your Congressmen since the start of the current session of Congress? (Yes) (No)

(Check one)

5 Are you on the Senators' or Representatives' mailing list to receive news-letters and other communications? (Yes) (No)

6 Have you ever done any work for the political party of your choice? (Yes) (No)

7 Have you ever made a financial contribution to the political party of your choice? (Yes) (No)

8 Did you vote in the last general election? (Yes) (No)

9 Are you registered or eligible to vote in the next election? (Yes) (No)

10 Do you know the name of your precinct chairman or captain for your political party? (Yes) (No)

Part Two — True or False (Check one)

1 Any company can circulate information to employees regarding the position of political parties and candidates on issues of importance to its operation. (T) (F)

2 A company can make contributions or expenditures in connection with political campaigns or elections. (T) (F)

3 Companies can urge stockholders and employees to evaluate the background, record and policies of parties and candidates and to support or oppose them in the light of such evaluation. (T) (F)

4 Companies can engage in "Register and Vote" campaigns and can encourage public affairs activities on the part of employees and stockholders. (T) (F)

True or False (Check one)

5 A company can prepare literature for candidates, or use company funds to buy advertising to support a candidate. (T) (F)

6 Companies can join together in organizing for political action in order to secure political support for policies believed to be beneficial. (T) (F)

7 Companies can engage in "get out the vote" campaigns including neighborhood canvasses, arranging transportation to the polls, and other efforts designed to encourage a large voter turnout. (T) (F)

8 Companies can encourage interested employees to run for party and political offices. (T) (F)

Answers to Public Affairs Quiz

Part One

The correct answer to each of the above questions is "Yes." The basis of self-government in our republic is an informed and active electorate. Yet, very few citizens can score even 50% on these questions!

Part Two

Correct answers: 1 (T); 2 (F); 3 (T); 4 (T); 5 (F); 6 (T); 7 (T); 8 (T).

an awakening to action on the national level recently appeared. A National Goals Commission, recently appointed by President Eisenhower, is charged with the mission of drawing up a broad outline of national objectives and programs for the next decade. Heading the commission is Dr. Henry M. Wriston, retired president of Brown University. Associated with Dr. Wriston on the commission is a group of devoted, concerned men, who will do their best to appraise our potential and to point out goals on which we can focus our learned, dedicated, adaptive effort.

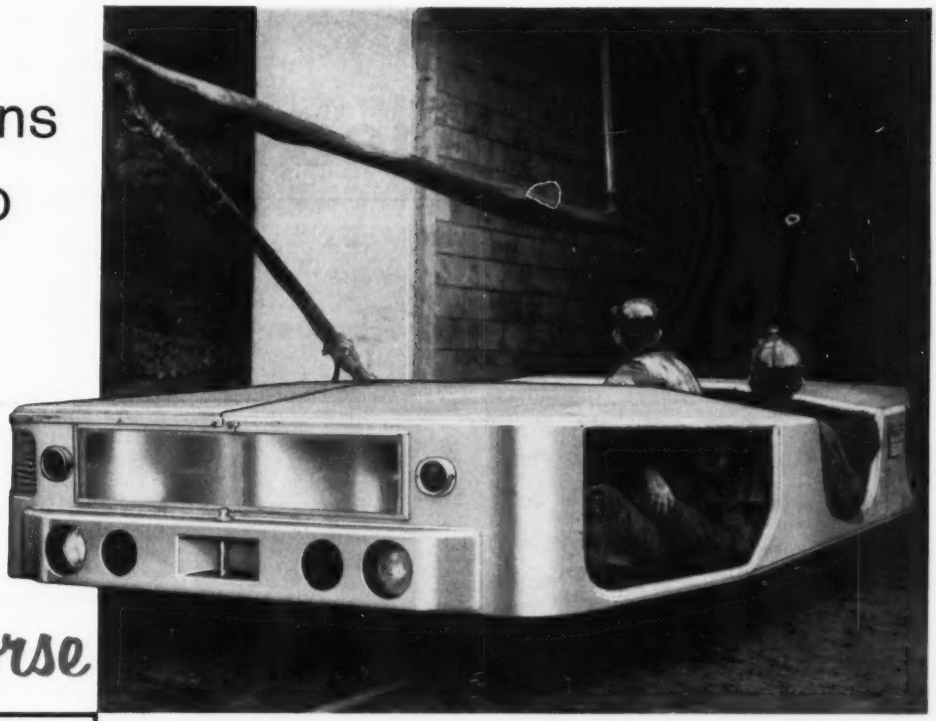
This is a matter of great importance to every thinking man in the country, to every man who has chosen to accept some measure of responsibility for the physical and moral growth of this country or one of its institutions. This includes the man who willingly has accepted any supervisory or managerial position in one of our industries.

Since we cannot have meaningful national goals without a hard core of informed, responsible citizens, the first order of business is for each one to begin to learn or relearn the mechanisms that make our system tick. It is suggested, therefore, that you submit to the test in the panel at the top of this page. How well do we really know even the most basic factors that closely affect us? You might find it profitable also, to read the currently popular novel *Advise and Consent*, by Allen Drury, published by Doubleday & Co., 1959. This is an eye-opener. It is a story, not without basis in fact, of how our very important business of government is conducted.

Perhaps your correspondent is too much moved by the fact that he is writing this on Feb. 12, 1960, the anniversary of Lincoln's birth. Perhaps not. It is an important matter. You, a responsible American, have a stake in it.

Reasons why so many mines use the

Lee-Norse



LOW mine portal bus

1. FAST—Cuts portal to portal time as much as 50%.
2. STREAMLINED—Transports 11 to 13 men in safety and comfort in low seams.
3. SAFETY—Exclusive split-roof allows operator full directional vision—trolley pole easily reached. Quick acting hydraulic truck-type brakes on each axle and on the traction gearmotor. Independent mechanical hand parking brake each axle.
4. POWERFUL—Self-propelled by sturdy traction-type 15 HP gearmotor (250 or 550V—DC).
5. RUGGED—Quality built to withstand the hard usage of 'round the clock mining!
6. LOW MAINTENANCE—Simple design—easy accessibility.
7. OPTIONAL FEATURE—Electric dynamic brakes for plus safety on severe grades.

LN

Lee-Norse Company

CHARLEROI, PENNSYLVANIA

Specialists in Coal Mining Equipment

Operating Ideas

Car-Dropper's Automatic Electric Taxi Saves Long Walk

THE LONG WALK back from the clean coal yard to the plant is a thing of the past for car droppers at Hanna Coal Co.'s Georgetown preparation plant, Cadiz, Ohio. Now the men ride back in style on the "Car Dropper's Special," an automatic electric locomotive. The "Car Dropper Special" travels back to the load by itself after carrying the men back to the plant. The use of this "taxi" not only makes possible more efficient use of personnel, but more importantly, reduces substantially the wear and tear on the men doing the job.

Hanna ships about 5,000,000 tons of coal from its Georgetown plant annually. About 3,500,000 tons of this are shipped by rail in over 50,000 railroad cars. Cars are loaded on five tracks and then must be dropped individually at a fixed speed over automatic electronic scales 500 ft below the plant.

Car droppers attach and remove car-retarder devices and brake each car down across the scales and into a 9-track assembly yard through switches controlled by the railroad-scale attendant. It was a long walk back to the plant, and since it happens up to 150 times a shift, it was many long walks for car droppers.

A few years ago plant personnel got the idea of eliminating this long walk and built the "Car Dropper's Special" to do the job. Now the returning car droppers step aboard the "taxi," press a button and ride back to the plant in less than a minute. They push another button and the locomotive returns automatically to its starting point in the assembly yard.

The car normally returns one or two car droppers and travels approximately 800 fpm (9 mph). It makes 100 to 120 round trips per 7¼-hr shift. This travel adds up to 10,000 mi per year.

The electrically powered car is built of aluminum and steel and weighs about 3,000 lb. It rests on two sets of 12-in mine car wheels with solid axles. Track gage is 42 in.

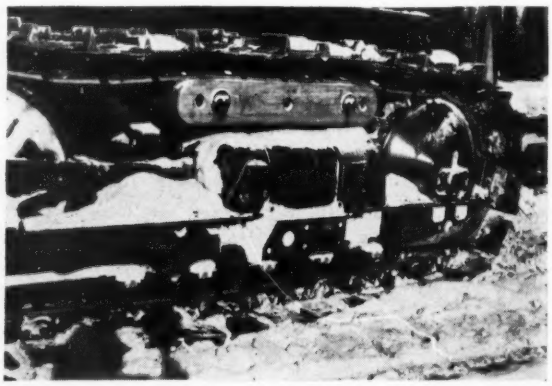
The car is powered by a 3-hp 440-V three-phase straight induction motor, driving by V-belt a gear reduction unit to single jack shaft and then to driven sprockets at each wheel on the driven axle.

The control consists of an ordinary combination reversing linestarter with forward, reverse and stop pushbutton control. Limit switches, mounted under the car, stop it at each end of the track. A magnetic brake on the motor pulley stops the car automatically when the drive motor is deenergized, thus providing braking control and fail-safe operation.

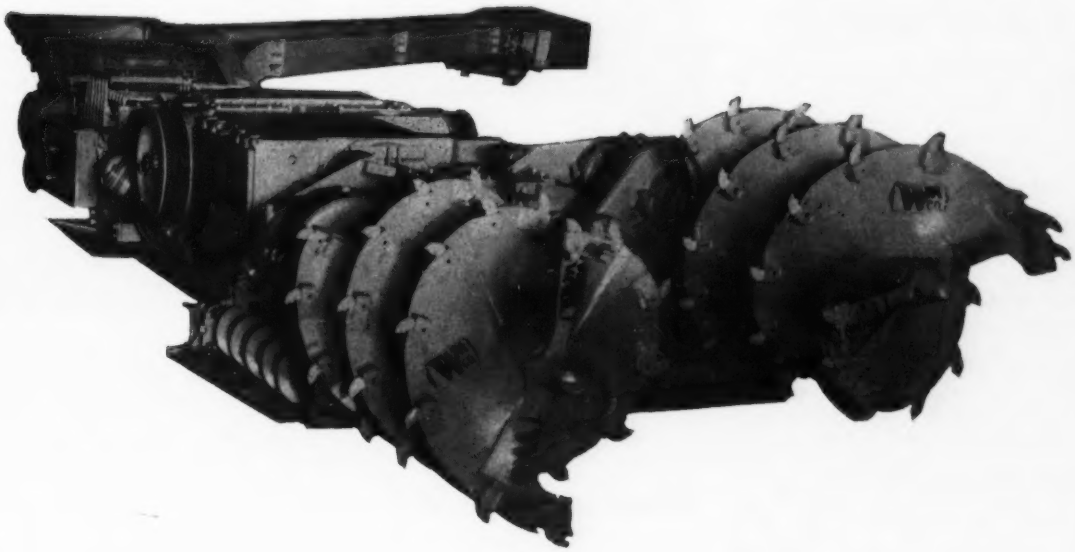
The power supply feeds to a point midway between the extremities of the track and then by 4-conductor No. 12 AWG portable trailing cable to the "taxi." The cable is clamped to a flexible grip on one side of the car and is dragged in a smooth ditch along the track. Care is taken to prevent catching the cable on the ties and other abutments as well as keeping loose gravel or coal from cutting it. Experience with a cablereel was unsatisfactory because of the speed of the car. Cable life has been satisfactory, with normal life 1 yr or more.

Special Wood Block Replaces Top Idler Rollers

HERE'S a new gimmick applied with tremendous success by the Great Northern Paper Co. on one of its International TD-9 crawler tractors. The firm developed a special wood block to replace the regular top idler rollers. Developed in the company's shop in Greenville, Maine, the block wears for an entire season.



SYMBOL OF PROGRESS IN THE WORLD OF MINING



THE WILCOX CONTINUOUS MINER

RECOGNIZED THROUGHOUT THE COAL FIELDS AS THE BEST MEANS FOR HIGHER PRODUCTIONS AT LOWER COSTS

NOW WITH ADDITIONAL NEW FEATURES SUCH AS

- ★ LUMP HEAD AUGERS
- ★ REAR MOUNTED CYLINDERS
- ★ FASTER FEEDS
- ★ CLEAN-UP SCROLLS & FLAPS
- ★ HYDRAULIC DRUM RELEASE
- ★ MORE HORSEPOWER

HAS RESULTED IN AMAZING SIZE CONSIST, WITH PRODUCTIONS UP TO 400 TONS PER SHIFT WITH 3 MAN FACE CREW, AND EVEN LOWER MAINTENANCE COSTS THAN EVER BEFORE.

FOR ADDITIONAL INFORMATION CALL CLIFFORD 2-6555 IN BECKLEY OR WRITE

WILCOX RALEIGH, W. VA. P.O. BOX 217

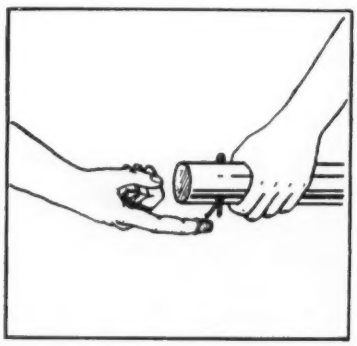
Operating Ideas (Continued)

Low-Cost Chute Serves Temporary Loading Point

SCRAP MATERIALS, fabricated into a loading point, provided a simple, inexpensive solution to the problem of loading mine cars directly from a fast-moving, high capacity belt pending the arrival of new cars and the installation of a permanent loading point at a West Virginia property, according to *Haulage Ways*.

Pivoting on a horizontal pipe, the chute bridges the wide gap between the ends of the cars. The horizontal pipe rests on two sections of vertical pipe, which are braced on three sides to make the support rigid. A lever attached to the pipe enables the man operating the car spotter to tilt the chute as one car is filled and the other is started.

A short distance inside the entry there is a cow bell suspended a few inches above the belt. When coal begins to come out on the belt, it strikes the bell and thus signals the man at the loading point a few seconds before coal begins pouring into the cars. He can be doing other jobs when no coal is coming.



Thimble Speeds Cotter Pin Removal

A SEWING THIMBLE comes in handy when removing a cotter pin in a cramped or narrow place, E. L. Taylor writes in *The Co-operator*, October, 1959. Mr. Taylor uses a thimble on his forefinger to straighten the bent ends of a cotter pin where it is difficult to use pliers for that job. After squeezing the ends together with a thimble-covered finger, pliers can be used to grab the head of the pin and pull it out.

When placing a new cotter pin it's easy to bend over one of the ends with a thimble-covered finger. This method gives you more control over the pin ends and eliminates the possibility of pliers slipping off when you are working in tight quarters.

Mr. Taylor also uses the thimble to prevent injury to the fingers when guiding wire rope through sheaves on Tournapulls. And it comes in handy to remove the cotter pin in the oil-pressure relief valve of diesel engines.

Concrete Mixer Is Efficient Explosive Handler

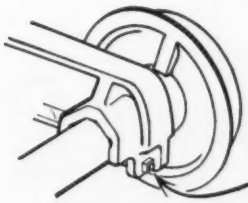
MIXING AND HANDLING ammonium nitrate type blasting agent in 5-cu yd concrete mixers increases efficiency of operations at a Pennsylvania strip mine. Advantages of this unit are:

1. Ammonium nitrate can be purchased in bulk at a reduced rate.
2. Ammonium nitrate and fuel oil are completely mixed by tumbling action.
3. Correct quantities of explosives are measured as holes are charged, thus making possible better fragmentation and eliminating waste of blasting agent.
4. Hole loading is speeded.

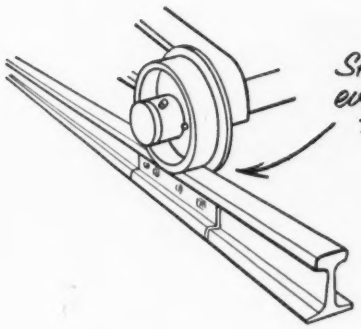
The only alteration to the mixer was to add a hopper at the rear discharge chute so that measured volumes could be delivered to each hole. The hopper has a scale, graduated in pounds, to indicate the volume being added.

A rubber sleeve attached to the bottom port of the hopper directs the nitrate-oil mixture into the hole. This flexible sleeve eliminates the need for placing the hopper directly over the hole. A hand-operated gate controls the flow of mixture from the hopper.

Movement between bolster and side frame is taken on specially designed wear surfaces

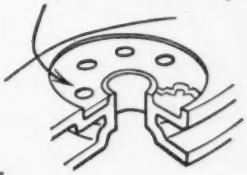


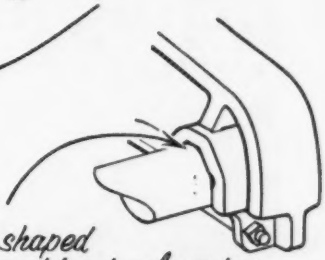
Quick wheel change



Smoother ride even on rough tracks

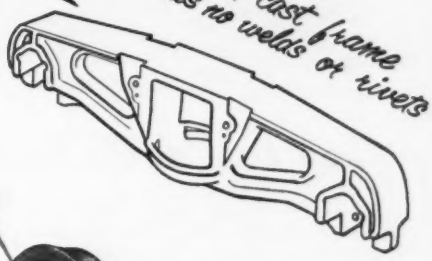
Large center bearing for longer life





V-shaped machined axle grips for controlled flexibility and truck alignment

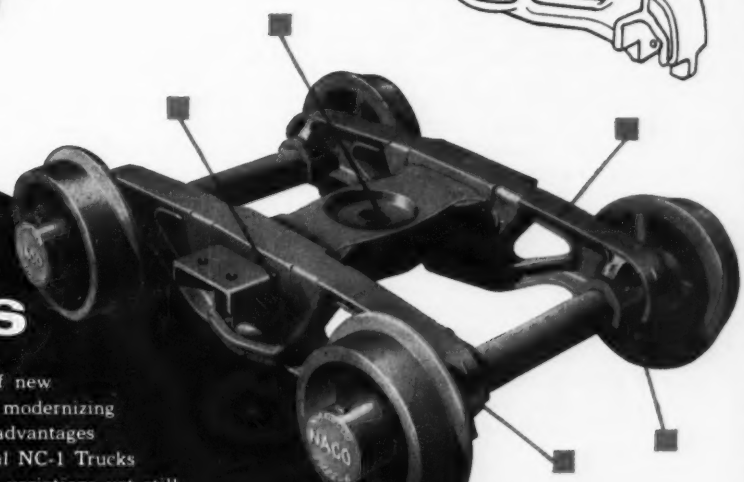
Integral cast frame has no welds or rivets



Check these "plus" features

OF

NATIONAL NC-1 TRUCKS



If you're considering the purchase of new 8-wheel mine cars . . . or if you're thinking of modernizing older cars—*now* is the time to check the advantages of National NC-1 Trucks. National NC-1 Trucks have controlled flexibility for track variations yet still maintain truck alignment through their machined V-shaped axle grips. In addition, NC-1 Trucks have a built-in shock absorbing mechanism.

You get more out of your mine car investment per workshift . . . per day . . . per year. And at the same time you minimize spillage . . . get greater protection for your equipment, track and structures . . . slash maintenance to a new low.

Yes, *now* is the time to check National NC-1 Trucks—they make sense for 8-wheel mine cars . . . *make dollars for operators*, too.

- WILLISON AUTOMATIC COUPLERS
- RUBBER CUSHIONED UNITS
- NC-1 CAR TRUCKS • NACO STEEL WHEELS
- NACO STEEL LINKS & SWIVEL HITCHINGS

AA-5077

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Established 1868 — *Cleveland 6, Ohio*

COAL AGE

Equipment Developments

Operator Safety Featured in New Wheel Loaders

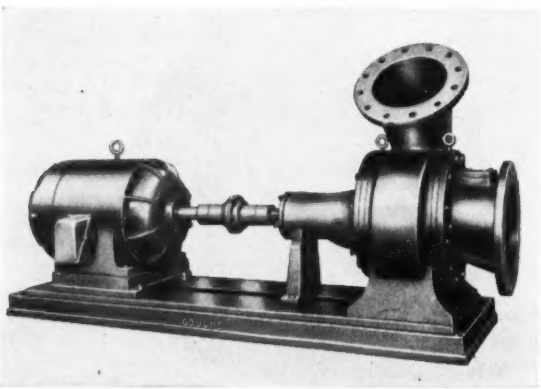
Cat No. 944, first of an entirely new line of wheel loaders from Caterpillar Tractor Co., Peoria, Ill., provides features designed for greater safety and efficiency. Most apparent highlight of the new machine is that all lift arms and hydraulic cylinders are ahead of the operator's compartment; and front tires of the machine are the farthest-forward portion of the frame, reducing risk of contact damage to truck bodies.

Fitted with a 2-cu yd bucket, the loader comes with diesel or gasoline engine, both rated at 105 net horsepower. Maximum rating of the D330 diesel engine is 135 hp. High productive ability, says Caterpillar, results from the combination of power shift transmission permitting split-second shifting, a high-capacity hydraulic system that delivers full power during critical loading phases and high machine stability in all conditions. Top dumping reach totals 31.75, maximum height, 9 ft, 1.87 in.

For better load handling, the bucket tips back 41 deg at ground level. Tip back at maximum lift is 50 deg. The power train of the No. 944 Traxcavator includes a power shift transmission, which is a two-speed forward, two-speed reverse, planetary type. It consists of four in-line gear trains, each with separate clutch. Two of the planetary trains control direction while the other two provide gear speed selection. The transmission permits 25% faster reverse travel, reducing cycle time for the machine.

The company has out a complete line of Traxcavator attachments, including a 2-cu yd side-dump bucket, similar to that available on track-type Traxcavators. A light-material bucket has a capacity of 3 cu yd and is recommended on the No. 944 for handling material under 2,000 lb per cu yd.

Bucket tooth groups, having replaceable tooth tips, are available for the standard bucket. A fiberglass cab with wide entry doors, wind-shield wipers and double-strength safety glass is also being marketed. Later this spring, Caterpillar will introduce the Nos. 922 and 966 wheeled Traxcavators, with features similar to the 944.



Tough Pumps

For severe operating conditions of the process and allied industries, Goulds Pumps, Inc., has announced a broad line of heavy-duty process pumps with capacity ranges up to 9,500 gpm and for heads up to 220 ft. The pumps are especially adapted for handling solids in suspension whether abrasive or non-abrasive, all types of slimes or slurries and other fluids under granular operating conditions where temperatures up to 350 F and working pressures to 400 lb are encountered. Pumps are of the end-suction vertically-split type, featuring back pull-out assembly which gives ready accessibility to all rotating parts without disturbing pipe connections. All pumps have 45-deg self-venting discharge connections as standard. Non-clogging solids-handling impellers with back ejecter vanes, external adjustment of clearance between impeller and renewable side plates and split glands for quenching and cooling chambers on bearings housings are other features.

Earthmoving

Ford Motor Co., Tractor & Implement Div., Birmingham, Mich., now offers a subframe and equipment hydraulic package to mount the new "Super-Duty" loader on Fordson Major

This crawler-mounted REICHdrill is the largest drill of its type ever constructed. Hole size: 12-16 inches in hard rock. Down pressure: to 90,000 lbs.

52% more hole per day in hard, dense sandstone

. . . another Reichdrill footage record against competing equipment of comparable rating on the identical job.

Coal field performance like this is standard with the REICHdrill. Why? Because:

. . . all-hydraulic top-drive rotary provides infinitely variable speed of drill rotation – the right speed for every formation

. . . direct drive to drill stem saves power loss

. . . no complicated transmission, no rotary table

. . . no kelly bar – in and out of the hole faster

. . . instant safety torque release protects all drive components – no broken bits

REICHdrill has built a reputation for keeping maintenance costs low . . . footage records high.

These features help set performance records: masts incline for angle drilling; CP heavy-duty compressors meet all air demands; fast-acting, ram-type hydraulic leveling jacks permit use of entire rig weight for down pressure; CP "Air-Blast" Bits for extra footage in toughest formations.

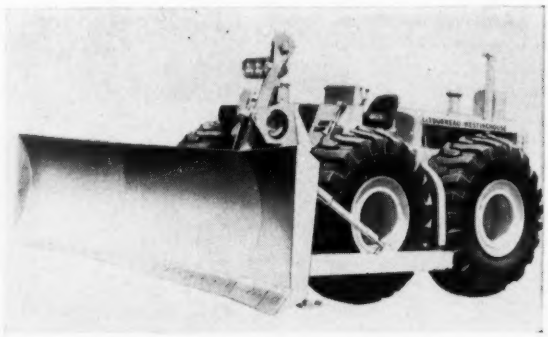
For further information, write:

REICHdrill

1439 ASH STREET, TERRE HAUTE, INDIANA

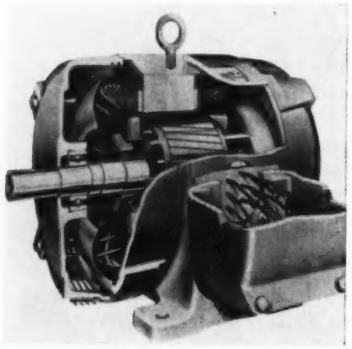
Division: CHICAGO PNEUMATIC TOOL CO.

Diesel and Fordson Power Major tractors. The package enables users to mount any combination of a Super-Duty loader or counterweight boxes on the Fordson models to fit his job needs. The new loader has a capacity of more than 1 ton and supplies a need for higher-capacity tractor-mounted loading equipment than has been available from Ford for FMD and FPM tractors. Lift capacity of the Super-Duty is 2,500 lb with breakaway capacity of 5,500 lb. It can raise a load to over 11 ft in height. Buckets with capacities of ⅝ and ¾ yd are attainable, and tests show, says Ford, that its tractors can load material faster and with less operator fatigue.



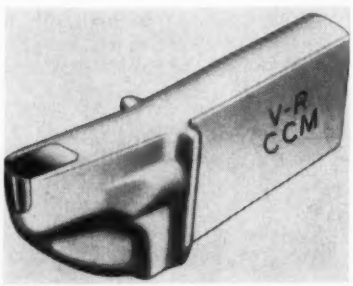
Bigger Blade

A new coal-handling blade that reportedly can push 6 to 12 tons of coal compared with 4 to 7 tons moved by a conventional blade, is available from LeTourneau-Westinghouse Co., Peoria, Ill. Designed for use with Model C Tournatractor, a 218-hp rubber-tired machine with speeds up to 17 mph, the "U" blade measures 15 ft from end bit to end bit and is 4½ ft high. This is 3 ft wider and about a foot higher than conventional blades, reports LeTourneau. The added size and curvature of the blade keeps coal moving in a live rolling action ahead of the machine, cutting down on normal resistance encountered.

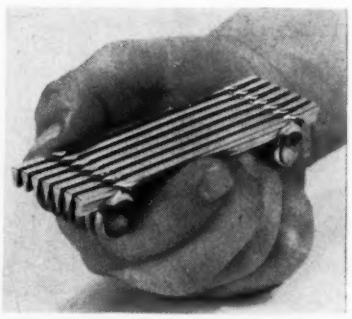


NEW MOTORS—New squirrel cage Life-Line® A motors from 3 to 75 hp are available from the Westinghouse Electric Corp., Pittsburgh 30, Pa. Low magnetizing current assures high power factor even at overvoltage and high starting torque provides positive "breakway" even on low voltage under the most severe conditions of "sticky" loads and icing, reports Westinghouse. Both the stator and rotor are designed to handle short time overloads. High-slip high-inertia design minimizes the current peaks caused by cyclic loading, thereby reducing power peaks. Other features include baffling in both brackets for protection against rain and sleet, cast iron frame and brackets and gasketed conduit box for corrosion resistance.

CHECKING LEVELS—The Euclid Electric & Mfg. Co., Madison, Ohio, is marketing its new "Sen-Tek" light-sensing level indicating system. The device detects and controls the level of opaque and solid materials. It will detect levels of coal, coke, slag, stone or ore and is easily installed on bins, tanks or hoppers. Sen-Tek requires no warm-up time, has no filaments to fail and does not lose sensitivity with age, adds the manufacturer.



STRONGER BIT—A new stronger chain cutter bit for continuous miners and universal-type miners is being marketed by Vascoloy-Ramet Corp., Waukegan, Ill. The pocket design of the new CCM's carbide tip provides extra brazing area and holds the carbide securely while additional steel on the sides gives the bit more strength. Cut-away nose shape reduces drag and regrinding time. The flange seats rigidly against the lug, preventing wobbling, carbide breakage, packing of cuttings and providing greatest possible resistance to side bending.

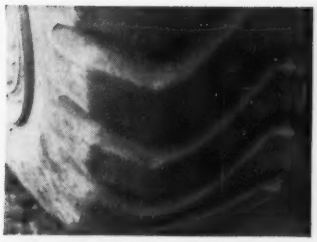


WIRE SCREEN—A new wedge-wire screen called "Rima," made of wire with thinner profiles than previously available, is being introduced by Cross Perforated Metals, National-Standard Co., Carbondale, Pa., for screening, sifting deepwatering sizing, washing and filtering. The high narrow profiles of the wedge wire permit more wires per area of working screen surface than other shaped-wire screens, increasing percentage open area and screening capacity, according to the firm. Screens are stainless and carbon steel, and come in rectangular, oblique angled, round and oval beds with sharp or round bends. Special shapes are also available.

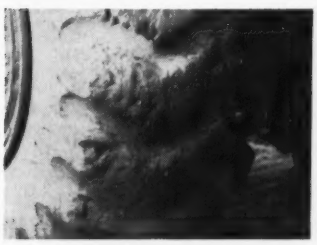
CONTROL CENTERS—Motor control centers with bus capacity from 200 to 2,000 amps for voltages from 110 to 600 are now available from Allis-Chalm-

B.F.Goodrich

Smileage!



HERE'S UNRETOUCHED PROOF of how the new B.F.Goodrich Cut Protected compound wears longer. Both tires were in service at the same time on identical jobs under identical conditions. Yet the Cut Protected compound tire at the top has given *approximately 900 hours more service* than the tire below. Note how little the CP tread is worn.



TRUCKS HAUL 44 TON gross loads over razor-sharp rocks at this Pennsylvania strip mine. Here's a job for the B.F.Goodrich Cut Protected compound tire. If the problem were dangerous heat build-up, you'd choose the new Heat Resistant compound.

B.F.Goodrich develops 2 new long-wear tire compounds

B.F.Goodrich Cut Protected and Heat Resistant compounds boost tire life, cut costs on mine jobs

TESTS show that B.F.Goodrich Rock Service tires made with new Cut Protected or Heat Resistant compounds outperform any other tires on the market.

Cut Protected compound gives longer service on jobs where:

- Rock cutting, chipping and abrasive wear are severe.
- Round-trip hauls are short.
- Trucks travel at low speeds.

Heat Resistant compound defies dangerous heat build-up on jobs where:

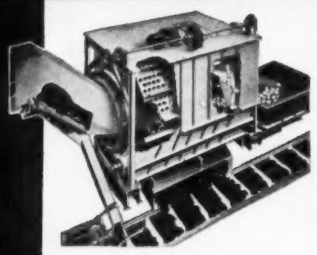
- Haul roads are well maintained.
- Trucks travel at high speeds.
- Cutting and chipping are at a minimum.

Intensive B.F.Goodrich research and testing went into the development of these compounds. Only B.F.Goodrich makes Cut Protected, Heat Resistant, and Regular compound tires that are actually tailor-made for your type of work. Your B.F.Goodrich Smileage dealer will recommend the best one for you. He's listed under Tires in the Yellow Pages of your phone book. *The B.F.Goodrich Company, Akron 18, Ohio.*

Specify **B.F.Goodrich Tubeless or tube-type tires when ordering new equipment**

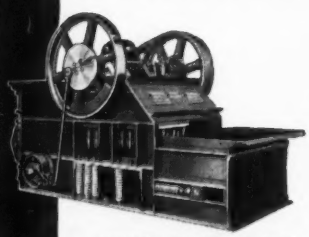
OFF-THE-ROAD TIRES BY B.F.Goodrich

America's most complete line of CRUSHING EQUIPMENT



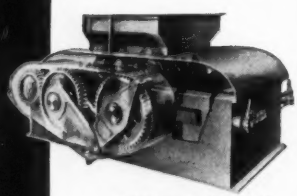
McNally Pittsburg Rotary Breaker

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



McNally Norton Vertical Pick Breaker

50% Less fines when reducing lump to egg and stove sizes.

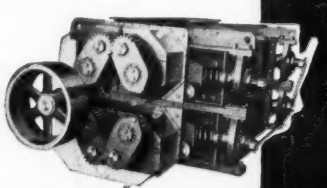


McNally Double Roll Gearmatic ROM Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.

McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.



McNally Two Stage Crusher

This unit consists of a double roll primary crusher mounted above a double roll secondary crusher—compactly arranged into a single rigid structure.

Available From Stock and on Short Delivery

For immediate action on complete information write, wire, or call

McNALLY PITTSBURG MFG. CORP.

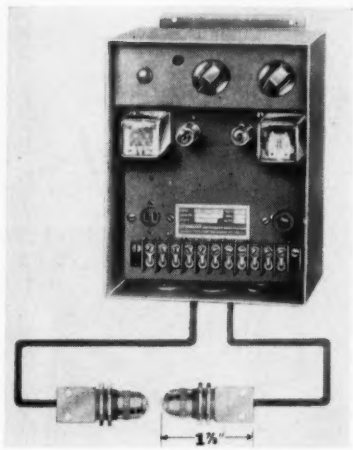
Pittsburg, Kansas Wellston, Ohio

Equipment News *(Continued)*

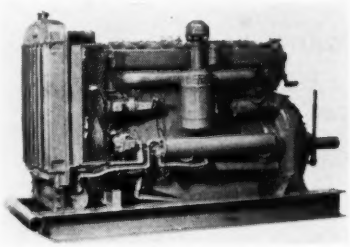
ers Mfg. Corp., Milwaukee 1, Wis. Coming either as fusible or circuit breaker combination units, the control centers consist of two or more starters fed from a common bus and are often attached to transformers or switchgear to form a unit substation. Centers offer improved operation, easier maintenance, and increased versatility over individual units and can be used to control electrical loads such as motors, lighting, welding and heating.

DRAINAGE—Many subsurface drainage problems reportedly can be solved economically by a new perforated asbestos-cement pipe offered by Johns-Manville, New York 16. Made of asbestos fibers and cement, the dense uniform structure of the pipe gives it great crushing strength, making possibile an economical wall thickness that assures an extremely good weight-strength ratio, says the company. Its smooth uniform interior and resistance to corrosion assure an extremely low frictional resistance to flow of water that continues low throughout the life of the line. Known as "Transite Underdrain" pipe, it provides a permanently tight yet flexible joint through use of mechanically exact plastic couplings, adds Johns-Manville. Diameters run 6, 8, 10 and 12 in with varying lengths.

GREASE SYSTEM—Trabon Engineering Corp., Solon, Ohio, announces its new compact gun-operated system for centralized lubrication of small machinery or where space does not permit mounting a manual or automatic pump. Up to 16 outlets may be handled from a single Type M assembly with outputs varying from .010 to .070 cu in of grease per cycle. A cycle indicater on the side of the assembly enables the operator to cycle the assembly the correct number of times to give each bearing its exact amount of lubricant.



ELECTRIC CONTROL—New "Robot-Eye" photoelectric controls, made by Standard Instrument Corp., New York 12, are designed for automatic industrial inspection, counting and control. The device can regulate sorting, traffic control, liquid level and bin level control, loop regulation and precision filling as well as other operations. It works on a beam-interruption principle or by reflection. Special design permits the user to select, from a wide variety of units, those precisely suited for his job requirements at minimum expense. Miniaturization and easy mounting are prime features of Robot-Eye.



DIESELS—Diesel MP Series engines and power units are available in sizes from 105 to 320 hp from Murphy Diesel Co., Milwaukee 19. MP Series generator sets come in capacities from 60 kw to 188 kw. Dual-fuel models and "Mech-Elec" units, capable of delivering mechanical and electric power simultaneously, are also available. According to Murphy, Diesel MP series engines have the high-rising torque necessary to take hold of a load and really hang on. This kind of lugging power helps keep equipment at the right operating speed for efficient production, declares the company.

CONTROL UNITS—Two new planetary-drive control units, the front-mounted Model 160 and the rear-mounted Model 260, are available for the International TD-25 crawler, recently announced by International Harvester Co., Chicago 1. The TD-25 is the largest most powerful

Low per-ton costs—with Sun's simplified underground lube program

Simplify your underground lube inventory by using two Sun products, and what happens? Your machinery runs longer and better . . . maintenance inspections become less frequent . . . and your production costs per ton go down.

Sun 740A-EP makes possible this decrease in inventory and increase in efficiency. It's recommended for *all* points of lubrication requiring *daily* maintenance, except hydraulics. It's a semifluid, extreme-pressure lubricant. It sticks like grease . . . and flows like oil. Sun 740A-EP resists heat and water, and protects parts against rust and corrosion.

Its full name is Sun Prestige 740A-EP Universal Mining Machinery Lubricant. And, the only teammate it needs is a Sun hydraulic oil.

Your Sun man can tell you the whole story. Or write to SUN OIL COMPANY, Dept. CA-3, Phila. 3, Pa. In Canada: Sun Oil Company Limited, Toronto and Montreal.

SUNOCO

MAKERS OF CUSTOM-BLENDED BLUE SUNOCO GASOLINE

17,122.05 TONS

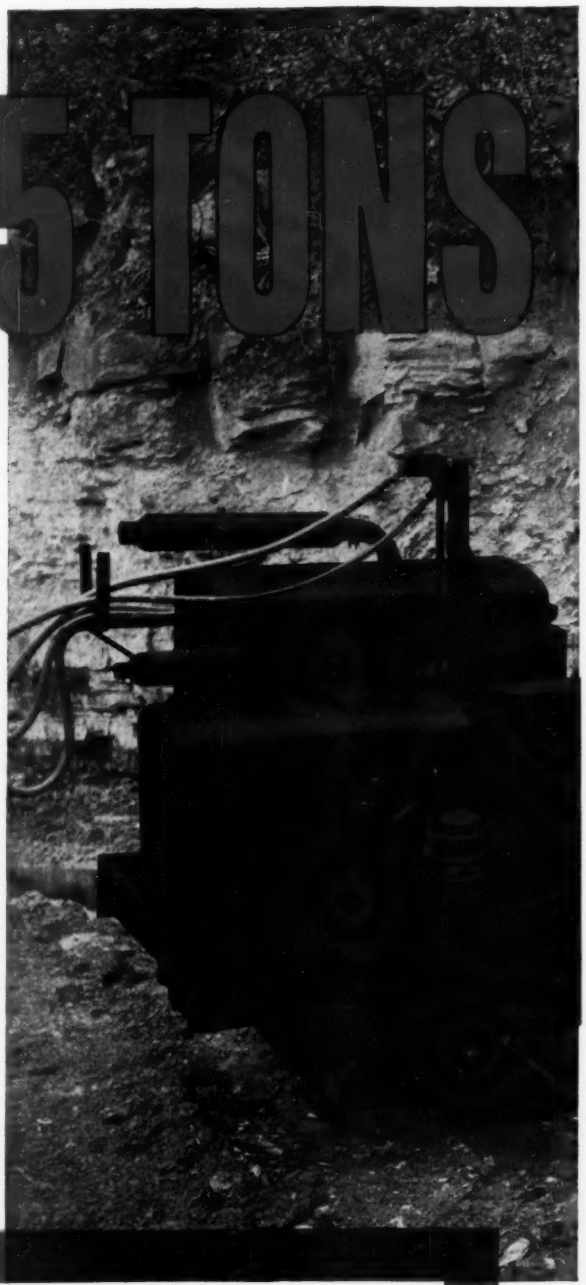
in Hazard #7 Seam

"We auger mined 17,122.05 tons of coal in October, 1959, with our McCarthy Coal Recovery Drill," says Stamper Collins. "We did it at $2.035 per ton. That includes ALL costs. We averaged 95 tons per man per shift as opposed to 13 tons in deep mining. We've had less than four days downtime due to mechanical troubles in more than two years."

Stamper Collins is an old, long-established user of Salem Tool equipment. He has produced as much as 64,967.90 tons of coal in five months. Like most Salem customers, Collins works his drill 'round the clock in all kinds of weather. He stops only for once-a-week servicing and maintenance.

These heavy, rugged, powerful units move from hole to hole under their own power on hydraulic skids. No extra 'dozer required. And they work close to the face—even on an inside curve of the highwall. Salem-built McCarthy recovery drills load from either side. You need only a two-man drill crew.

If BIG TONNAGE at low cost is important to you, get the facts on Salem's McCarthys today. Initial investment is less; pit-to-pit moves faster; set-up quick. Add it up . . . augered coal costs less with a McCarthy!



TWO-MAN OPERATING CREW adds new auger quickly. This Model 1500-30-36-42 has faster carriage travel and greatly increased horsepower. Built-in conveyor speeds loading.

SALEM TOOL COMPANY

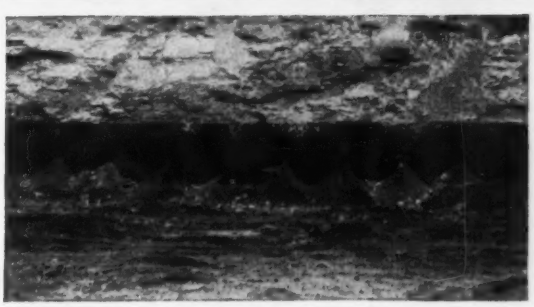
763 SOUTH ELLSWORTH AVE. • SALEM, OHIO

IN ONE MONTH

ABOVE—DRILL OPERATES at top speed even on this narrow, wet bench. Self-moving, heavy-duty hydraulic skids float drill over soggy earth. Individually operated jacks quickly set drill for best angle.

TOP RIGHT—LUMP SIZE can be controlled with Salem cutting heads. Salem operators have ready markets for their high quality coal.

RIGHT—EVENLY SPACED HOLES show ease and accuracy of auger placement. Drill can move just a fraction of an inch if desired! You mine maximum amount of coal.



EASIEST WAY TO MAKE ENDS MEET

VICTAULIC®

The Time-and Job-Proven Method of Reducing Piping Costs

Let the Victaulic Method save you money on piping costs. Whatever piping material you choose, Victaulic can join it and provide fittings. You save in material cost, in installation time, and in reduced piping maintenance cost.

CUT COSTS WITH OVER 1100 VICTAULIC ITEMS FOR BETTER AND EASIER PIPING

Standard Couplings

Lightweight Couplings

Rigid Couplings

Roust-A-Bout Couplings

Snap-Joint Couplings

Plainlock Couplings

Malleable Iron Fittings

Stainless Steel Fittings

Aluminum Fittings

Plastic Fittings

PVC Lined Fittings

Cast Iron Fittings

Plainlock Fittings

Vic-Groover Tools

Vic-Easy Tools

For complete information on any Victaulic product, write:

VICTAULIC COMPANY OF AMERICA

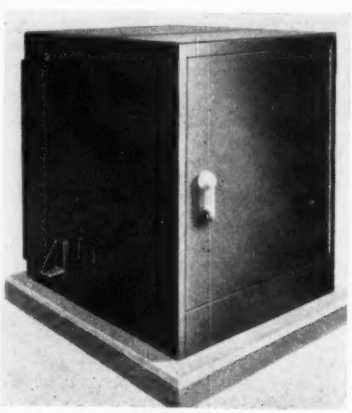
Dept. 14-3 P. O. Box 509, Elizabeth, N. J.

Plug Valves

Equipment News (*Continued*)

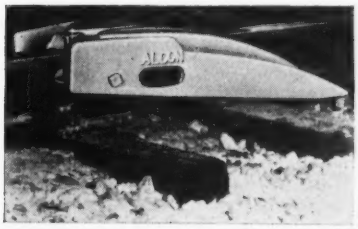
machine of its type ever produced by I-H. The single-drum Model 160, with brake capacity of 9,000 lb line pull at bare drum speed, is a heavy-duty fast-acting control. A two-piece brake and clutch and construction assures longer clutch and brake life and provides flexibility and more accurate braking, according to International. The double-drum Model 260 represents a new concept in cable control units, using a ring gear and pinion to drive a four-gear planetary system for each cable drum.

LIGHTING—The latest mercury vapor floodlight from Stonco Electric Products Co., 333 Monroe Ave., Kenilworth, N. J., features a patented full-floating socket construction that adjusts automatically to changes in lamp sizes and shapes, insuring a perfect weather-seal with all makes of R-60 reflector lamps. By mounting the socket on a compression spring that cradles it in a protective coil of floating steel, many common causes of premature lamp failure are practically eliminated, such as excessive vibration, shock, pole whip, arcing, socket corrosion, and water seepage, according to Stonco.

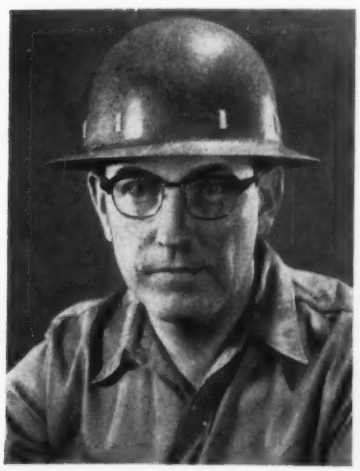


TRANSFORMERS — Wagner Electric Corp., St. Louis, Mo., announces a new line of "Sub-Urban" pad-mounted dis-

tribution transformers, designed for surface mounting on a concrete pad. Primary and secondary underground cables run through the pad into a tamper-proof enclosure for connection to terminals. The transformers, which blend in with shrubbery and landscaping in many commercial developments, are said to provide maximum operating efficiency, service continuity, complete safety, low maintenance cost and are easily adapted to handle future load growth. They come in single-phase ratings 25 to 167 kva, and three-phase ratings 75 to 500 kva, 15 kv and below.



CAR REPLACER—The Aldon Co., Chicago, Ill., announces the Universal car replacer, which had been modified and improved to provide positive controlled direction of the wheels from ground to rail head, assuring rerailment under all conditions. The manufacturer states that in addition to an apexed channel at the critical head point of the replacer, side guard walls are provided to assist direction of stubborn trucks, if necessary. This improvement, coupled with the fact that a combination of any two castings can be used as a pair, makes these car replacers the most efficient and foolproof available today, according to the firm.



SAFETY HATS—Bausch & Lomb Optical Co., Rochester, N. Y., has added a line of safety hats and caps to its array of safety products. They feature contour-fit suspension with a design of pliable polyethylene, providing "soft-hat" comfort without top-heavy feeling, declares the firm. Lock straps assure minimum

Valve bank of coal loader is rebuilt with Aeroquip Hose Lines, quickly and easily made up from Aeroquip Bulk Hose and Reusable Fittings.

Aeroquip Hose Lines are made up to length as they are needed, eliminating bulky inventories of pre-assembled hose lines.

SAYS JIM SAMS, MASTER MECHANIC, GALIS ELECTRIC & MACHINE CO. MORGANTOWN, WEST VIRGINIA

Galis Electric, largest mine machinery rebuilding company in the U. S., uses Aeroquip Hose and Reusable Fittings on all of its rebuilt mine equipment.

Aeroquip Flexible Hose Lines absorb the shock and vibration of heavy duty service. They are easily made up, in shop or field, with hand tools. Because the fittings are reusable, they can be used again and again to make up replacement hose lines as needed. You reduce downtime, simplify maintenance and cut costs with Aeroquip Hose Lines. Call your Aeroquip Distributor, listed under "Hose" in your Yellow Pages.

Aeroquip 1509 Hose, with Reusable Fittings for high pressure hydraulic and air lines (up to 5000 psi., depending on hose size).

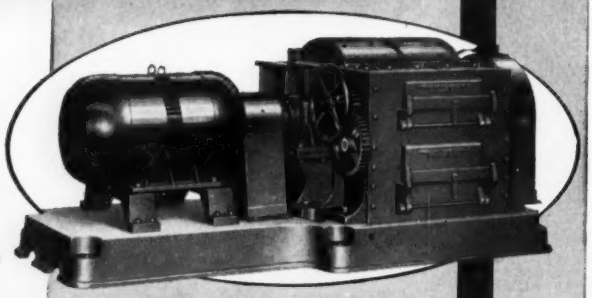
Aeroquip

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

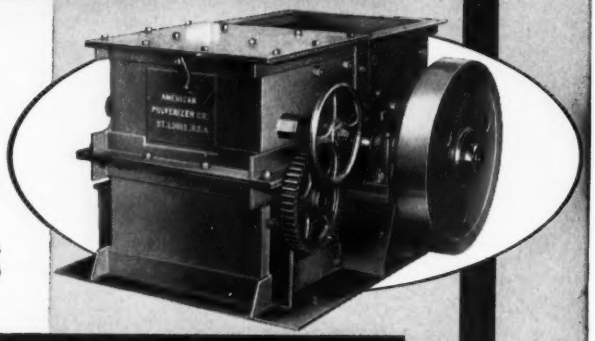
AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

When You Figure . . .



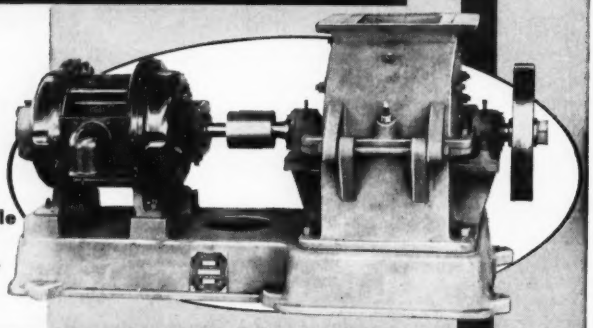
AC Series
capacities to
800 TPH

Reduction
Cost Per Ton . . .



WC Series
capacities to
90 TPH

the Best Answers*. . .



Coal Sample
Crushers
capacities to
2000 Lbs.
Per Hr.

Come from American
Ring Coal Crushers

*In a recent independent survey, it was found that American Crushers reduced over 61,000,000 tons of coal at a parts replacement cost (including standby parts) of *less than 1/10th of 1¢ per ton.*

THERE CAN BE NO BETTER PROOF OF AMERICAN QUALITY!

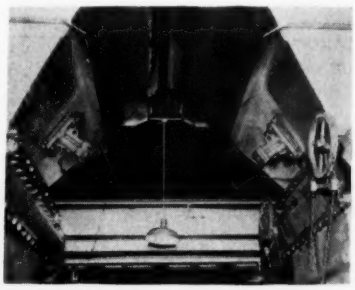
American
PULVERIZER COMPANY

WRITE for Literature on These Crushers

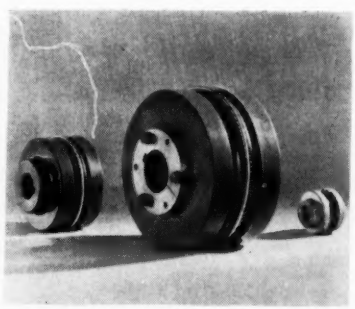
1119 MACKLIND AVE. • ST. LOUIS 10, MO.

Equipment News (*Continued*)

crown clearance of 1¼ in and a numbered snap-in adjustment permits quick easy fitting to any head size from 6⅝ to 8. Hats are constructed of resilient corrosion-resistant fiber-glass, a special resin-glass formula providing them with fire-resistance and strength.



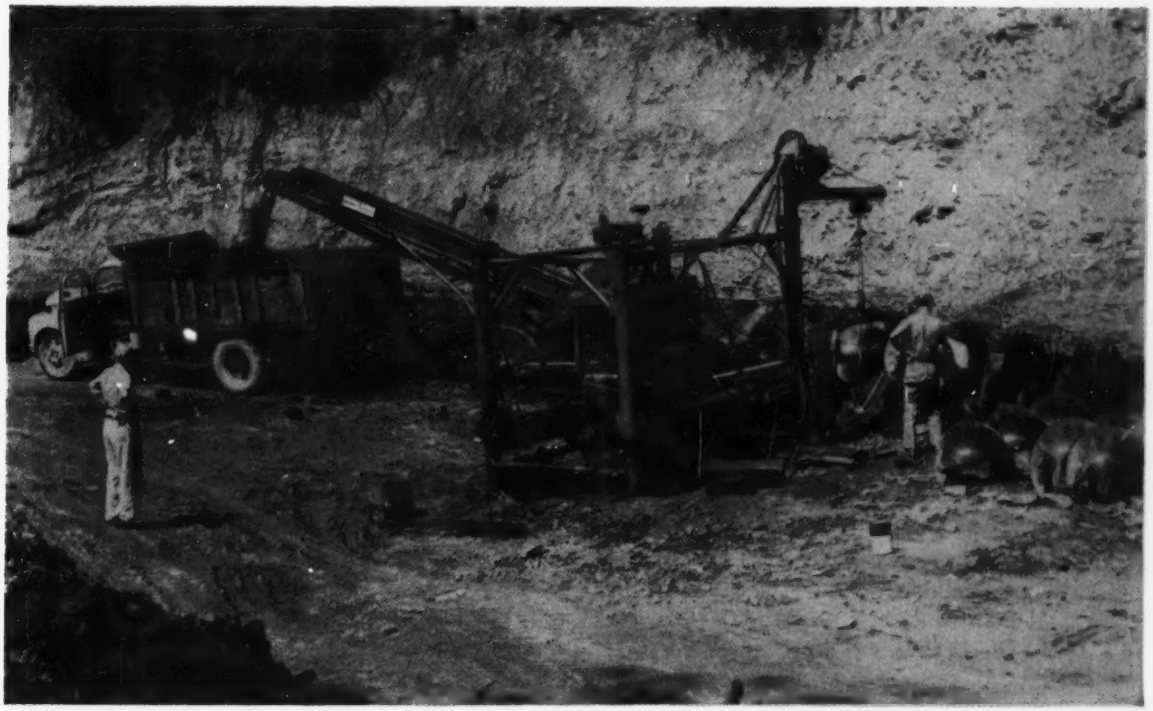
MOVING COAL—New BH-3 long-stroke vibrator keeps coal with high moisture content moving at preparation plants, states National Air Vibrator Co., 435 Literary Rd., Cleveland 13. The vibrator features a patented one-piece design that cuts maintenance, downtime and repairs, according to Navco. There are no body assembly bolts to shear or stretch, base plate is an integral part of the body, and the piston is the only moving part in the device, dislodging arched material with a direct, timed stroke.



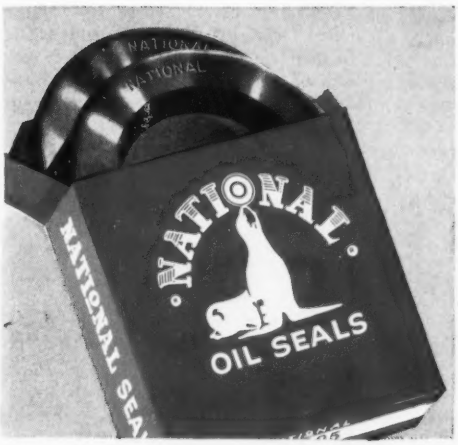
COUPLINGS—Low-cost "Sure-Flex" couplings are available from T. B. Wood's Sons Co., Chambersburg, Pa. Described as a Junior line, couplings come in three sizes: 3J, for stock bores from ⅜ to ¾ in; 4J, for bores from ½ to 1 in; and 5J, for bores from ⅝ to 1⅛ in. Peak horsepower ratings at 1,750 rpm are: 3J—1.5 hp; 4J—3.0 hp; and 5J—6.0 hp. The Junior line, which retains all the desireable features of standard "Sure-Flex" coupling line, is less expensive because of new alloy use and simpler design, explains the manufacturer.

VIBRATOR LINE—The addition of 49 new sizes, in two motor capacities, to its line of motorized counterweight vibrating feeders, has been announced by Link-Belt Co., Chicago 1. The firm now

Better products, *faster*, from your National Seal distributor:



National Oil Seals are the most positive protection against abrasive grit . . . the enemy of all bearings



Regular replacements with National Seals keep high-production machines working profitably

Special mining machines, as do all valuable production equipment in the coal industry, need the superior protection afforded by National Seals. The small investment required for regular replacements with National Seals pays off manyfold in the prevention of machine downtime and production loss.

National exclusive *Micro-Torc* leather, or *Syntech* rubber, seals offer quick availability in standard sizes for any application you may have.

Call in your National Seal distributor now. He's nearby and can specify the right seals for the job.

NATIONAL OIL SEALS

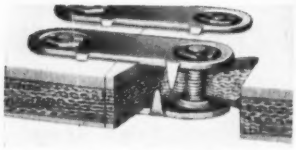
FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

NO BELT SPLICING PROBLEMS HERE...THEY USE FLEXCO® FASTENERS!

(PHOTO TAKEN AT PEABODY COAL CO., MINE #10, PAWNEE, ILL.)

Tight production schedules require dependable belt fasteners!



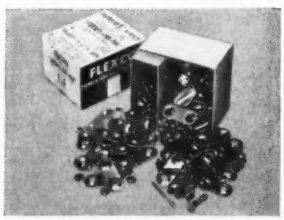
Cutaway of a Flexco application showing the compression plates, teeth and precision-made bolts and nuts.

Daily, the thousands of "working" belt splices throughout the country are proving the superior holding power of FLEXCO joints (no other belt fastener is so widely used). Belt maintenance crews like to work with Flexco fasteners because they are easy to apply—joints last a long time — worn plates can be replaced quickly—ideal for repairing rips and tears.

PROTECT YOUR INVESTMENT IN CONVEYOR BELTS WITH FLEXCO . . . the quality fastener for all heavy-duty conveyor belt applications: COAL & METALS, SAND & GRAVEL, CRUSHED ROCK, CONSTRUCTION EQUIPMENT, etc.

Available in Steel, Monel, Stainless, Everdur. Also Promal top plates.

FLEXCO "25-PAK"



"25-PAK" contains enough fasteners to join common belt widths.

ORDER FROM YOUR DISTRIBUTOR, OR WRITE TO US FOR BULLETIN F-112.

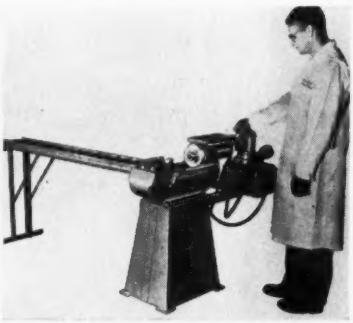
"FOR THE SPLICE OF A LIFETIME"

Flexible STEEL LACING COMPANY

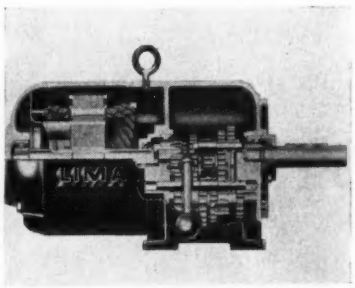
4638 LEXINGTON STREET CHICAGO 44, ILLINOIS

Equipment News (*Continued*)

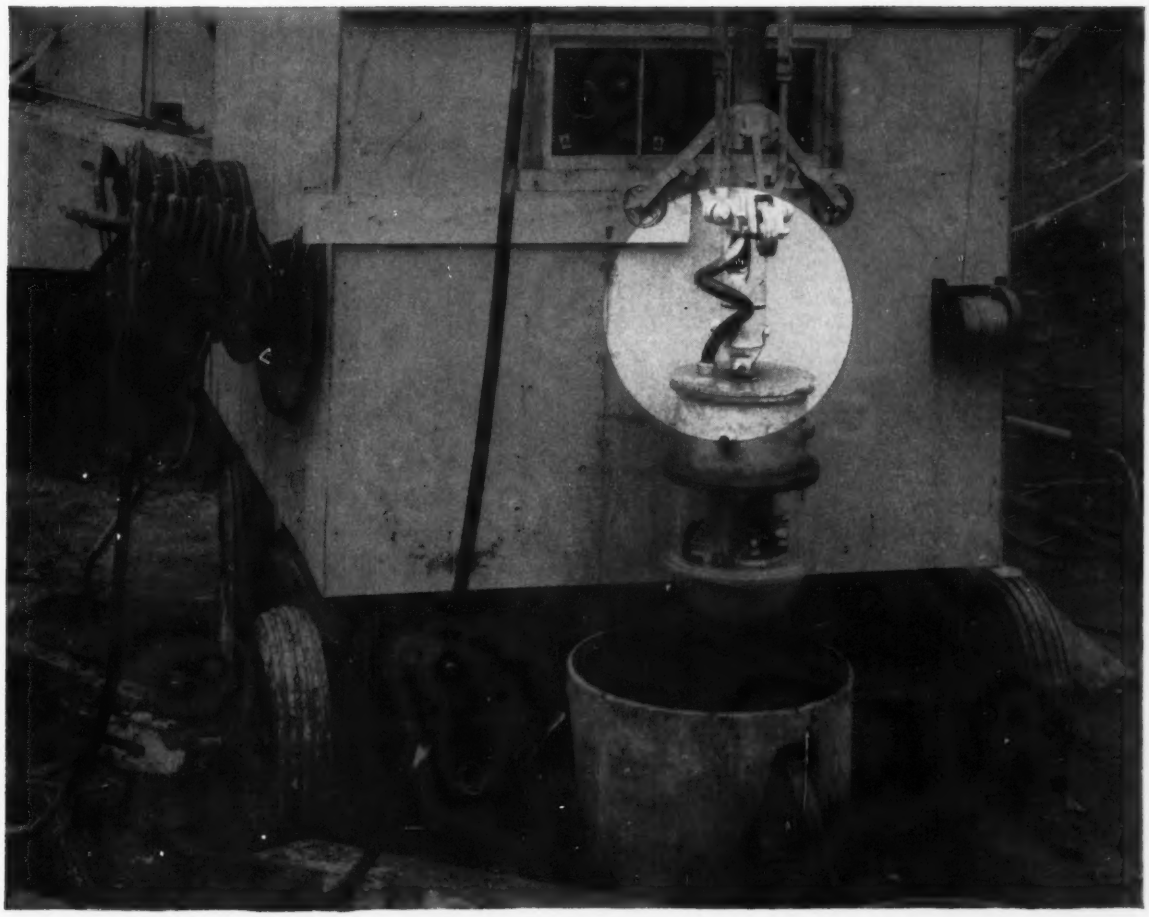
offers more than 60 sizes of MC feeders with capacities up to 1,700 tph. The all-new MC motorized counterweight feeders consist of a trough and either a single or double motorized vibrator line, mounted directly on the rugged channel frame. The vibrator is driven by specially-designed motors, with a double-extended shaft on which counterweights are mounted. An unbalanced arrangement of weights imparts a straightline oscillating or vibrating motion to the trough.



NEW PRESS—An improved track pin press, No. Y360-A, for servicing tracks on small crawler-type tractors, is announced by Owatonna Tool Co., Owatonna, Minn. Operating time for removing and replacing pins and bushings has been cut considerably by the Y360-A, says the firm. The machine incorporates a new 35-ton single-cylinder double-acting ram and the OTC "Vanguard" Y-26 series two-stage hydraulic pump. Ram approach is now 4 to 5 times faster. Press frame and ram assembly are mounted on a sturdy base and can be easily transported for on-the-job repairs, adds OTC. To facilitate handling of track, 5-ft sections of track roller conveyor are available which may be bolted together to any desired length.



GEARSHIFT DRIVE – Redesigned internally, Type R3 selective 4- or 8-speed gearshift drive is now available for mounting in any position, from The Lima Electric Motor Co., Lima, Ohio. Besides any-position mounting, design changes include stress-proof steel shafting in the motor and gear box, with



OPTIC NERVE FOR EYES THAT SEE 100 FEET BELOW THE SURFACE

This is a television camera. Its job is to photograph the substrata of excavations, thereby providing information needed by engineers in planning the construction of Boston's new Prudential Center, a modern, multi-million dollar real estate development.

Here in the Back Bay section of Boston, with its artificially maintained water table, this sealed camera must go down into a water-filled hole 100 feet below the surface. To transmit the picture from the camera to the surface monitor, Lake Service Corp. of Brighton, Massachusetts, designers and manufacturers of the television equipment, chose Simplex Anhydrex XX insulated cable because of its ability to withstand the rigors of submarine and direct burial duty.

For all types of service involving high and low voltages, whether aerial, underground or submarine, or for everyday plant wiring, it pays to call a Simplex Engineer.

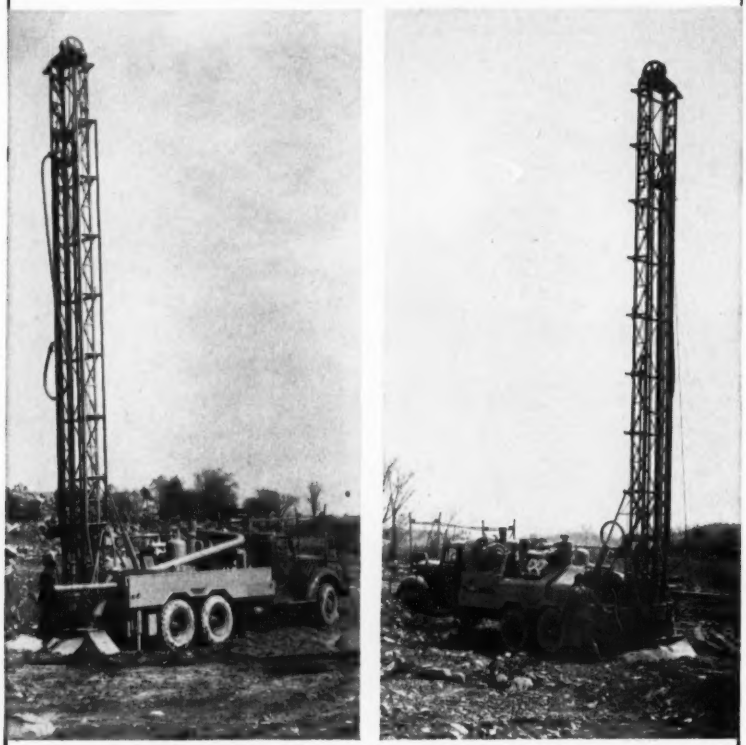
BALANCED COMPOUNDING

1885 Diamond Jubilee 1960
75 Years of Leadership in the Wire and Cable Industry

Simplex
WIRE & CABLE CO.
Cambridge, Mass. • Newington, N. H.

DAVEY **Rotary Drills**

cut coal drilling costs!



Davey Model 8-MA at U.S. Coal Co., Holloway, Ohio.

For more economical, faster drilling . . . increased production at reduced costs, leading strip operators rely on Davey.

Suitable for mounting on any make of truck, Davey Rotary Drills move fast between blast holes . . . are ideal for low cost core drilling with air . . . easy to set in drilling position.

Daveys are offered in 8 different truck-mounted models—air blast, mud pump or combination types. Rated capacities to 3,500 ft. Features include choice of power take-off or separate power unit operation, automatic hydraulic feed with manual override, heavy-duty rotary table and rugged tubular box-type mast. Tractor mounted drills also available. A-232A

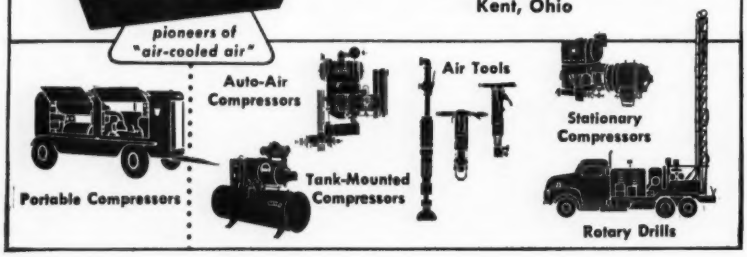
Write for Bulletin E-702S!

DAVEY

pioneers of "air-cooled air"

DAVEY COMPRESSOR CO.

Kent, Ohio



Equipment News (*Continued*)

hardened splines on the spline shaft for extreme service requirements and long life. Countershaft roller bearings and spacers are replaced with lifetime sintered bushings, and double-width sealed and lifetime-lubricated ball bearings have replaced single-width bearings on the output shaft and motor shaft. Type R3 comes with standard single-speed motors of 1,800, 1,200 or 900 rpm and horsepower ratings of 1, 1½, 2, 3 and 5. Two-speed motors are available. The drives operate on stardard 208, 200/440 or 550 V, 3 or 2 phase, 60 cycle current supplies.

PUMPS—A new line of heavy-duty hydraulic rams and independent pumps with attachments and accessories has been introduced by Duff-Norton Co., Pittsburgh, Pa. Combining versatility and portability, the new "Ram-Pac" line provides from 10 to 100 tons of force, in any direction, for heavy moving, lifting, pushing, pulling, adjusting, testing and bending. The five pumps include two hand, one air, one electric and one gasoline-powered.

CAR SHAKEOUT—Hewitt-Robins, Inc., Stamford, Conn., is adding a new railroad car shakeout to its line of materials-handling equipment. Called the "H-R Trackside," it is mounted in fixed position alongside the railroad track where hopper cars, either open or covered, are to be unloaded. A hydraulic cylinder exerting a 14-ton force, pushes a vibrating head against the side of the car shaking it and knocking compacted or frozen material loose to flow through the hoppers. The new shakeout is anchored in the ground and push-button controlled for safe remote operations. The unit weighs 2,400 lb, has a 7½-hp high-torque vibrator drive and a 3-hp high-torque pump drive. It is designed to meet the needs of operations requiring the unloading of 1 to 10 hopper cars per day of coal, aggregates, ores or other bulk materials. No manhandling of a heavy suspended weight is required as with clamp-on shakeouts, making for greater safety. The company reports that the price is $3,450.

Equipment Shorts

Welding Rod—A new nickel-silver gas welding rod, Airco No. 21, is being marketed by Air Reduction Sales Co., New York 17. Formulated for superior flow and bonding properties, it can be used with mild, cold rolled, hot rolled, hot carbon, tool, cast and stainless steels, cast iron, Inconel, Monel, copper nickels, bronze and malleable iron. Airco No. 21 gas welding rods can be applied in

(*to p 155*)

NYGEN-BUILT

GENERAL TIRES

will outlast . . . outdrive any other truck tire ever built!

For top performance at the lowest cost-per-mile, roll your units on General Tires. Built with exclusive Nygen Cord and tread-designed for sure-footed power and traction, General Tires will keep your projects on schedule . . . help insure deserved profits. In construction, logging, quarrying or mining there's no tire to equal General.

THE GENERAL TIRE & RUBBER CO. Akron, O.

New Truck Features Electric Wheel

Power, performance and bonus productivity are features of the new "Lectra Haul" 55-ton pay load diesel electric truck, declares the manufacturer, Unit Rig Equipment Co., Tulsa, Okla. In recent demonstrations, reports the company, the 41-ft long truck showed remarkable maneuverability and versatility in turning, climbing, starting, stopping and dumping. Powered by a 600-hp Cummins VT-12 diesel engine that generates current for GE electric motors mounted in the rim of each wheel, the vehicle is expected to cut hauling costs from 10 to 30%, according to Unit Rig officials.

Motorized wheel drive eliminates torque converters, transmissions, propeller shafts and drive axles, thereby reducing drive system maintenance. Electro-dynamic brakes, a feature of the machine, provide highest continuous braking without fading or mechanical wear, states the company. Longer life, lower maintenance expense and maximum use of power and equipment are a result.

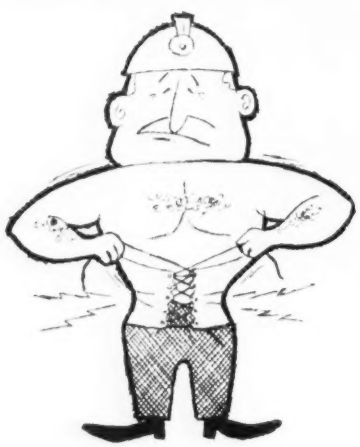
The Lectra Haul requires no more effort to steer and brake than a much smaller conventional truck, it is noted. It has a conventional arrangement of steering wheel, foot throttle, brake pedal and other controls, eliminating special driver training. There are no gears to be shifted.

In tests, the machine was loaded with 55 tons of limestone and driven up a 6% grade at 8 mph, demonstrating its ability to perform with a full pay load. The entire load was dumped in just 23 sec by means of hydraulic rams. The vehicle will take grades up to 15% fully loaded, cutting haul length and reducing road maintenance expense.

After leaving the bottom of a pit, reports Unit Rig, the truck was run at high speed with full load making gross weight 110 ton, and was brought to a fast easy stop, demonstrating the effective holding power available with electric motors for dynamic braking. Parking and emergency brakes employ hydraulic aircraft disc types on all four wheels with no-friction brakes for downgrades included.

General specifications are: length, 21 ft 8 in; width, 14 ft; height, 14 ft 4 in; wheelbase, 21 ft, 5 in; gage, center to center, front tires, 9 ft 9 in; gage, center to center, rear tires, 10 ft 9 in; and ground clearance, minimum trailer frame, 2 ft 3 in.

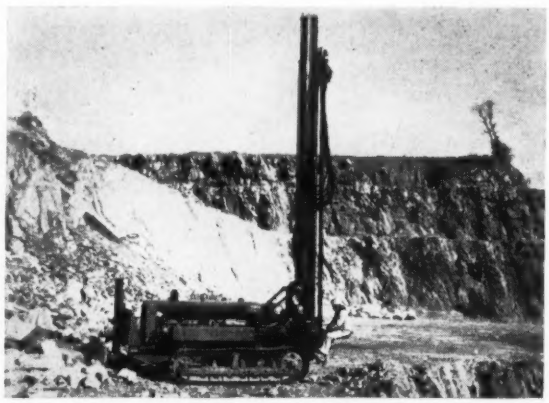
Tight Maintenance Budget?



USE KELLY REPAIR PARTS!

You can save headaches and money too on repairs to underground machinery by using KELLY parts. They last longer! Fully guaranteed and product insured.

KELLY MANUFACTURING CO.
STEEL FABRICATING DIVISION, MIDDLEPORT, OHIO
MACHINE PARTS DIVISION, CHARLESTON 21, W. VA.



Rotary Drill

Schramm, Inc., West Chester, Pa., is offering the new Model C42 RotaDrill, a completely self-contained single-unit drill rig with air compressor and drill steel capacity for 60-ft deep holes. Designed for one-man operation, the rig has all control in front of a sulky seat which is mounted on the crawler at the drilling station. Besides riding the rig when moving from hole to hole, he can drill to depth of 20 ft without leaving the sulky seat. A "Lazy Susan" drill steel rack mounted on the mast holds two additional lengths ready for immediate use on deeper holes. The crawler tracks have a spread of 7 ft 8 in, giving the C42 excellent stability and the time-saving advantage of being able to move from hole to hole under most conditions with the mast in the vertical drilling position. The machine features hydraulic power, independently-driven tracks and down pressure up to 12,670 lb. Controls are also hydraulically operated.

all positions without fuming or overheating the base metals. Rods are available in 36-in lengths in 1/16-, 3/32-, 1/8-, 5/16- and 1/4-in diameters.

Communication—Motorola Inc., Chicago 51, is expanding its transistorized line of Motrac two-way radios with the introduction of a 100-W unit to operate in low-band frequencies. Besides the new unit, the firm manufactures 25-W and 50-W models in low band and 30-W, 60-W and 80-W models for operation in high band frequencies. Features of the units include low operating costs, low battery drain, rugged chassis construction and reliability, according to the firm.

Lubrication—Anderol L-456, a multipurpose oil for gears, slides bearings and precision parts, has been developed by the Lehigh Chemical Co., Chestertown, Md. Featuring good extreme-pressure qualities, penetration, compatibility with ordinary lubricants and long life in general purpose applications, this medium heavy diester oil has an over-all temperature range of 40 to 350 F. It is said to have a low evaporation rate, a viscosity index of 174 and remarkable resistance to sling-off, drip-off and wipe-off.

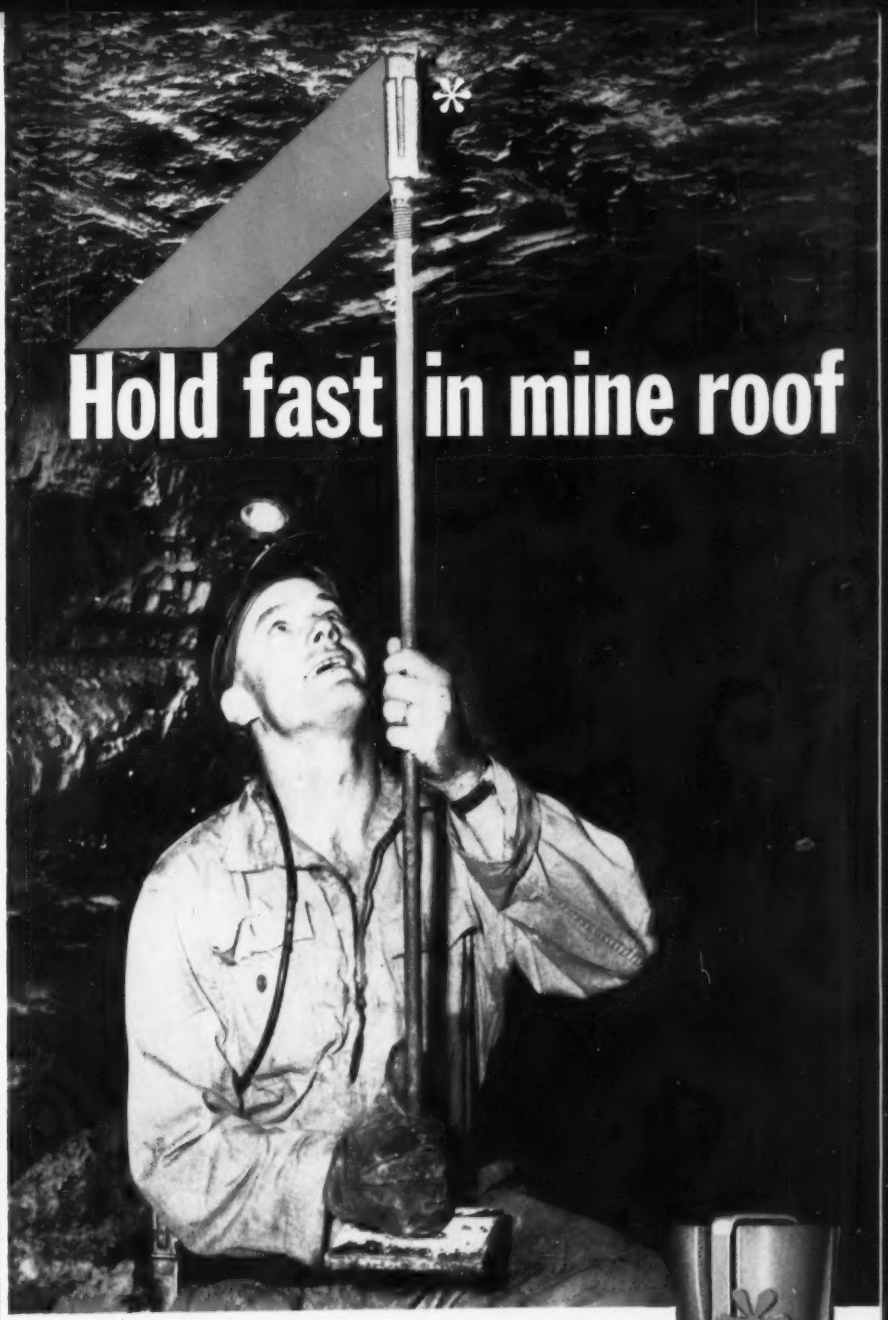
Generators—A new series of big power Winco engine generators are in production at Wincharger Corp., Sioux City, Iowa. The 7,500-W engine generators provide 50% more power at a price near that of an ordinary 5,000-W unit, reports the firm. The machines are designed for portable or standby use.

Check Valves—Two more models have been added to the line of hydraulic check valves for 3,000 psi operating pressure, from Parker-Hannifin Corp., Cleveland 12. The valves are for in-line mounting, with internal pipe thread connecting port in one end and "Triple-lok" machining on the other end for J.I.C. flared tube connection.

Carbon-Arc Burner—A new carbon-arc lead burner, easily carried in a tool box, has been designed by Exide Industrial Div., The Electric Storage Battery Co., Philadelphia 20. Said to be handy for making emergency on-the-job repairs to industrial storage batteries and for general heating jobs, the burner has a pencil-tip carbon heating rod to melt the lead, and is much faster, according to the firm, for removing connectors than the alternate method of drilling out terminal posts.

Free Bulletins

Car Wheels—Bethlehem Steel Co.,



Ohio Brass 4-Way Expanding Anchors hold in both soft shale and hard rock

- **GO UP FAST** . . . 4-way expansion begins with the first turn of the wrench.
- **DEVELOP TOP HOLDING POWER** with easy wrenching effort . . . 150 "foot pounds" of torque gives bolt tensions of 9000 pounds.
- **WORK IN CLOSE QUARTERS** . . . O-B engineers developed these anchors underground. Personal knowledge of mining problems enabled them to design units that are especially suited to your needs.
- **GET SERVICE** for your roof bolting problems . . . see your local Ohio Brass engineering representative or write Ohio Brass Company, Mansfield, Ohio.

O-B Bail Type Expansion Shell and Plug

Ohio Brass (B) HOLAN

EXPANSION SHELLS AND PLUGS • LINE MATERIALS • SAFETY AND CONTROL EQUIPMENT • ELECTRIC HAULAGE MATERIALS

10043-M

YOU CAN SEE WHAT MAKES ROEBLING MINE POWER FEEDER CABLE YOUR BEST BUY!

Tough, long-wear Roeprene® sheath wards off moisture, retards flame, resists oil, corrosion, abrasion. Meets flame-resistance requirements of Pennsylvania Dept. of Mines and carries symbol P-111.

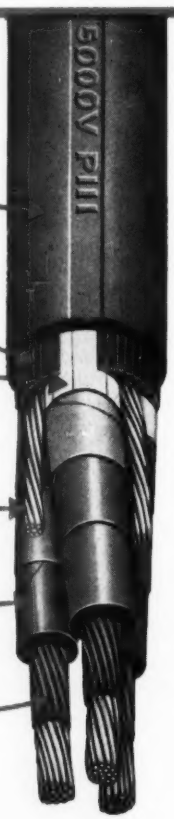
All-rubber fillers for moisture resistance, splicing ease.

Tinned-copper shield tape for added safety of operation.

Adequate ground wires, in contact with conductor shielding. Grounds equal more than 90% of circular mil area of single power conductor, for complete grounding and fault return.

Butyl insulation for heat-, moisture-, ozone-resistance. Rated at 90° C copper temperature through 5000 v; 85° C through 15000 v.

Semi-conducting tape around each conductor prevents excessive voltage stress and ionization between conductor and insulation.



These are features that add up to longer, better, more economical service. Even at peak loading, rugged Roebling Mine Power Feeder Cable gives peak performance!

Pride of workmanship, special design features and finest raw materials make the difference. But don't take our word for it. See for yourself. Let us show you samples and give you recommendations and details as they apply to your application. Write to Electrical Wire, John A. Roebling's Sons Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

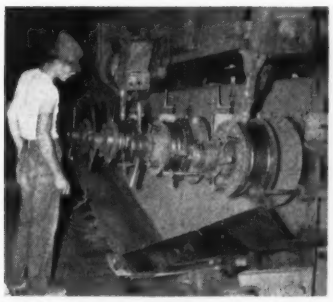
Increase the life of your wheels with S-D Hard-Faced Treads and Flanges...

"Modern mass-production equipment has catapulted Sanford-Day into the position of top mine wheel 'rehabilitation center' of the country."

—Fusion Facts

Why you save on S-D Hard-Faced Wheels (New or Reclaimed)

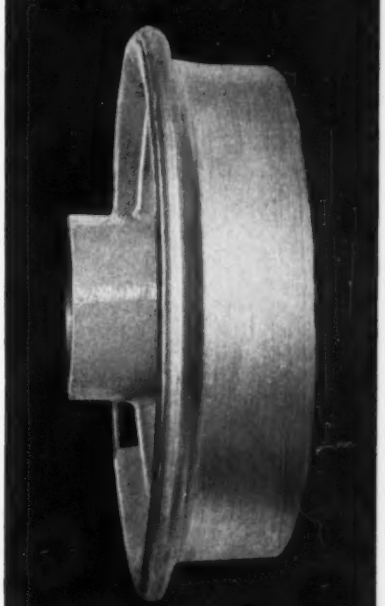
For years wheels like the one at right had to be discarded. Its (1) Tread and (2) Flange are "worn-out". But otherwise the wheel is as sound and serviceable as a new one. We have solved the problem of getting **wearing material** on a wheel where it does some good . . . **on the tread and flange where it is used!** We have reclaimed thousands upon thousands of "worn" wheels by successfully applying high alloy materials to the tread and flange of discarded wheels. These reclaimed wheels have earned such favorable savings, and due to oftentimes tripling their service life, many users have been ordering **new wheels** S-D Hard-Faced. They save the cost and down time of changing and reclaiming wheels when ordinary wheel flange and tread wear out.



Several completely automatic fixtures, such as this one, were developed at Sanford-Day in cooperation with the welding industry to mass-produce S-D Hard-Faced new wheels and reclaim old ones. Heads are shown here depositing high alloy on treads. A different alloy is used on flanges. Secret of long wheel life is obtaining wheels furnished with wearing surface on treads to take "impact", while wearing surface on flanges will take "scrubbing". S-D Hard-Facing assures you maximum and equal service of both tread and flange!

What counts is the proper alloy on the tread and flange! Over given period of time your wheel requirements will be reduced substantially when you order and use S-D Hard-Faced Wheels. Write us today for BULLETIN E-100 that furnishes complete information and specifications. **Sanford-Day Iron Works, Inc., P. O. Box 1511 . . . Telephone 3-4191, Knoxville, Tennessee.**

Worn wheel above shows typical condition of wheels formerly discarded. Field reports and customer experiences with S-D Hard-Faced Wheels show that reclaimed wheels, like one below, often give three times the service life of unprotected ones at far less than new part cost.

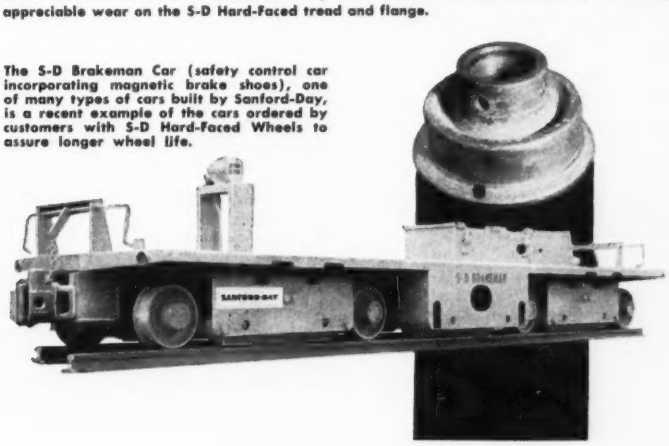


SANFORD-DAY

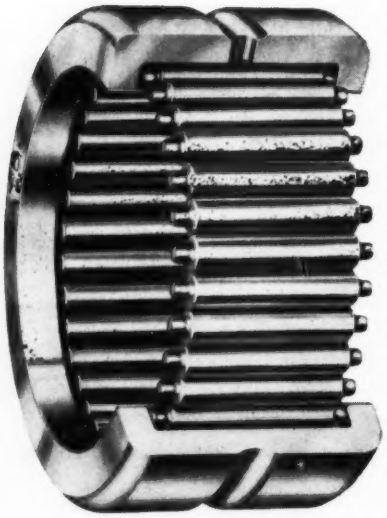
KNOXVILLE TENNESSEE

Pictured below is a test wheel after many months service in severe service. It shows no appreciable wear on the S-D Hard-Faced tread and flange.

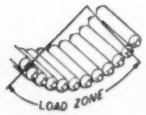
The S-D Brakeman Car (safety control car incorporating magnetic brake shoes), one of many types of cars built by Sanford-Day, is a recent example of the cars ordered by customers with S-D Hard-Faced Wheels to assure longer wheel life.



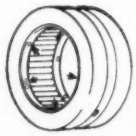
WHY TORRINGTON HEAVY DUTY NEEDLE BEARINGS



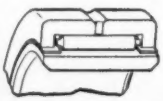
provide efficient anti-friction performance under heavy radial loads



Maximum Load Carrying Capacity is assured by the full complement of rollers with precision-controlled diameters.

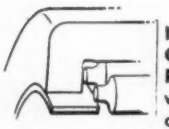


Rollers are Positively Retained by stainless steel retaining bands, spot-welded into position. Resist entry of foreign matter. Fragile lips eliminated.

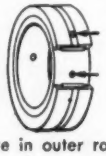


Bearing rings and rollers are made of selected bearing quality high-carbon, high-chrome steel.

The values you get in the performance of Torrington Heavy Duty Needle Bearings are complemented by the services of your *Authorized* Torrington Bearing Distributor. You can get prompt service to meet your needs from his complete stocks. Call on his experience to assist you with installation and maintenance procedures, or for advice on new or special applications. Contact your nearest Torrington Bearing Distributor in the list to the right—and specify the best—Torrington Bearings. THE TORRINGTON COMPANY, South Bend 21, Ind.—and Torrington, Conn. District Offices and Distributors in Principal Cities of United States and Canada.



Increased Strength, Capacity and Wear Resistance are provided by large roller diameters allowing maximum trunnions with large fillets.



Easy, Effective Lubrication of race channel and rolling elements is effected through lubrication groove in outer race and oil holes in both inner and outer races.

TORRINGTON BEARINGS

SPHERICAL ROLLER BEARINGS • NEEDLE BEARINGS • ROLLER THRUST BEARINGS • NEEDLE THRUST BEARINGS • CAM FOLLOWERS

Bethlehem, Pa., explains in a 4-p booklet how forged-steel mine-car wheels speed haulage, increase mine safety and reduce maintenance.

Screening—New 24-p catalog from W. S. Tyler Co., 3615 Superior Ave., Cleveland 14, describes operation principles and applications of Hum-mer electric screens. These material-separating screens, with no bearings and low power requirements, offer unequalled economy, according to the firm, and are described with dimensions and recommendations in the booklet.

Engines—A revised folder, "International Engines and Power Units," has been issued by International Harvester Co.'s Costruction Equipment Div., 180 N. Michigan Ave., Chicago 1. Included are 24 models, from stripped engines to complete power units.

Magnetic Pulleys—A complete line of Erium-powered permanent magnetic pulleys is described in a new booklet from Eriez Mfg. Co., Erie 6, Pa. The Eriez line, including more and larger sizes than ever before, makes available permanent magnetic pulleys capabe of performing as good as or better than many electro types, says the firm.

Separators—Operating principle and photomicrographs of several materials handled by the new multi-stage push-type centrifugal separator announced recently by the Chemical Machinery Div. of Baker Perkins, Inc., 1000 Hess, Saginaw, Mich., are included in a new brochure released by the division. Data on construction and operation of the machine are included.

Diesel Care—You can get a 24-p booklet on diesel engine maintenance from Cummins Engine Co. Inc., Columbus, Ohio. The literature outlines 10 steps for increasing equipment availability, reducing operating costs and obtaining better performance.

Compressors—Atlas Copco, 545 5th Ave., New York 17, offers a 4-p booklet describing its stationary air compressor line, including data on its "Twin-Air" rotary screw-type machines which deliver up to 19,400 cfm at 100 psi.

Screw Equipment—Applications and selection of screw conveyors, screw feeders and components are subjects discussed in Booklet 2989 from Link-Belt Co., Prudential Plaza, Chicago 1. The 76-p booklet illustrates over 20 types of screws, 14 types of troughs, and two types of feeders. It explains how screw conveyors are used for conveying and elevating, distributing, reclaiming and other processes.

Hoses, Fittings—Industrial Catalog No. 204 containing information about hose, fittings, self-sealing couplings and related products, is available from Aeroquip Corp., Jackson, Mich. The catalog includes complete up-to-date specifications.

Welding—Gas welding and cutting hand torches, outfits, tips and accessories can be found in a new bulletin from Air Reduction Sales Co., Div. of Air Reduction Co., Inc., 150 E. 42nd St., New York 17. The firm's complete line of equipment is covered in detail with descriptions, features, specifications and photographs.

Drill Bits—Detailed information, including assembly data and prices, on Asco diamond drill bits is presented in a new catalog from Anton Smit & Co., 111 8th Ave., New York 11.

Torque Converters—Clark Equipment Co.'s Automotive Div., Jackson, Mich., describes its 14-, 15- and 16-in torque converters for industrial power transmission applications in a new 4-p folder. In addition to detailed descriptions of optional equipment such as clutch controls and reduction drives, complete power curves for each of the three basic models are provided.

Brakes—Trombetta Solenoid Corp., Milwaukee 2, offers a 16-p booklet describing five new lines of solenoid-operated brakes. They are offered in several sizes from a 2½- to a 14-in wheel.

Tractors – Specification bulletins explaining the engineering features enabling two new Trojan tractor shovels, Models 134 and 164, to deliver maximum production for the user, combined with fast economical operation, have been released by Trojan Div. of the Yale & Towne Mfg. Co., Batavia, N. Y.

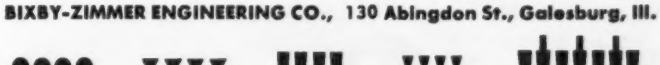
Excavator—Eimco Corp., Salt Lake City, Utah, has announced a new bulletin, No. L-1091, outlining use of the Eimco 105 excavator on three recent major jobs around the United States.

Valves—A new type of quick-acting slurry valve is described in a 2-p bulletin published by Everlasting Valve Co. Jersey City, N. J. Recent design innovations including an open valve chamber and wedge shaped moving parts are illustrated and described.

Arc Welding—An arc welding supply catalog provides information on the complete line of arc welding accessories and supplies available from Hobart Bros. Co., Troy, N. Y. Included are headshields, grinding shields, goggles, cleaning tools, electrode holders, cable connectors, ground clamps and other equipment.

Your product has to be best . . . and so do your screens. Your present equipment can be equipped with Bee-Zee Screens, round-rod as shown above or in any of the special rod shapes shown below. Screens are all-stainless-steel and *all-welded*, with electronic control spacing the rods precisely. Find out how Bee-Zee Screens turn problems into profit — to make you money. Wire, write or phone Galesburg DIckens 2-5154 collect.

BIXBY-ZIMMER ENGINEERING CO., 130 Abingdon St., Galesburg, Ill.



Bee-Zee Screens in a wide variety of shapes and sizes meet the needs of leading firms in the coal, minerals, quarry, oil, food, chemical, plastic, brewing, distilling, pulp and paper, rubber and other industries.

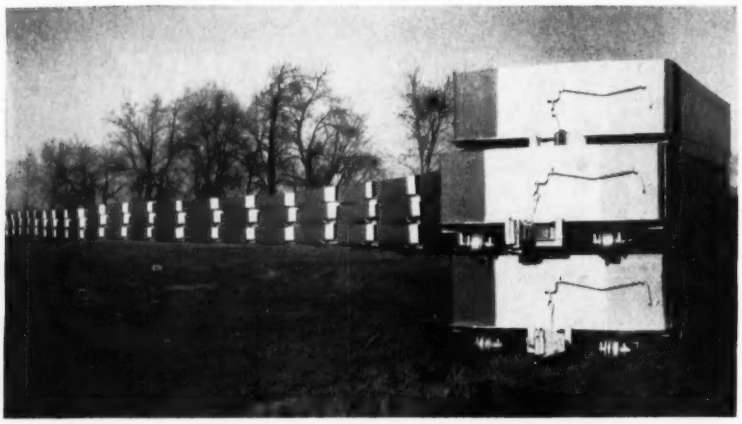
Among the Manufacturers

Reynolds Metals Co. appointed McJunkin Corp., Charleston, W. Va., distributor of aluminum pipe. Sales will be handled from McJunkin warehouse stock in Charleston; Pittsburgh; Marietta, Cincinnati and Columbus, Ohio; Louisville, Ky.; Atlanta, Ga.; and Houston, Tex.

Allis-Chalmers Co. sold and transferred certain "Texrope" V-Belt drive products to Machinery Sales Corp., New Bedford, Mass. The trademarks, "Magic-Grip" and "Magi-Key" have been assigned to Machinery Sales Corp., which will manufacture and sell Magic-Grip sheaves and bushings as standard items.

H. K. Porter Co., Inc., Pittsburgh-based manufacturing concern, has purchased over 90% of the stock of the Patterson-Sargent Co., of Cleveland, Ohio, makers of "BPS" paints for home and industry. Patterson-Sargent has plants at Cleveland, and Long Island City, N. Y.

Differential Mine Cars



...from here to infinity

Y. & O. Coal Company placed their first order for 8-wheel cars with Differential—100 Differential AXLESS mine cars well in advance of their target date to open Nelms No. 2 mine, Hopedale, Ohio. You see them here—ready for delivery.

First orders and re-orders combine to make Differentials the most popular mine cars. Why? Because, for any given length, width and height you can load more tons of coal in a Differential car than in any other make! Ask us to prove it!

where can you match it?

Since 1915—
Pioneers in
haulage equipment

DIFFERENTIAL
STEEL CAR COMPANY
FINDLAY, OHIO

Peter W. Miller is the new sales manager of Link-Belt Co.'s Caldwell plant in Chicago. He joined the engineering department of the Caldwell plant in 1941 and has held positions of sales engineer and manager of product sales. Mr. Miller will be in charge of administration and sales matters for package handling systems and products.

Robert J. McGinnis, appointed senior sales representative for the Mining Tool Div. of Kennametal, Inc., joined the firm in 1945 as salesman and has been a district sales supervisor for the last 12 yr. Kennametal also named **Dick W. Welch** Northern Dist. sales manager.

National Mine Service Co. has announced new assignments for six sales engineers.

The men will handle these territories: **Paul W. Smith**—southern West Virginia, north of Beckley; **Elmo Merideth**—southern West Virginia, south of Beckley; **Earl K. Gardner**—northern West Virginia and southwestern Pennsylvania;

James J. Ward—Illinois, western Kentucky, Indiana and Alabama; **Ronald E. Fink**—Pennsylvania (except Uniontown), Maryland, New York, Ohio and the northern and eastern panhandles of West Virginia; **R. Park Lamborn**—Utah, Colorado, Nevada, Idaho, Montana, Wyoming, New Mexico and Arizona.

R. L. McChain will be manager of construction and mining industry sales for the Le Roi Div., Westinghouse Air Brake Co. The appointment is part of a sales reorganization, under which, emphasis will be placed on selling by markets rather than product lines. Mr. McChain will be assisted by **C. L. Meigs** and **N. W. Reinker,** while **D. S. Permar,** as manager, general industrial sales, will be responsible for sales of large stationary and the smaller unit-type air compressors to general industry.

J. J. Larry has been named sales engineer, Beckley Territory, Bluefield, W. Va., district, for the Mining Div. of Jeffrey Mfg. Co. Mr. Larry was previously sales engineer with home office in Columbus, Ohio. **Fred Shafferman,** formerly at St. Clairsville, Ohio, replaces Mr. Larry in the Columbus office of the Jeffrey organization.

New appointments at Goodman Mfg. Co., in the Sales Dept.'s Belt Conveyor Div., include: J. W. Hardy, conveyor analyst; **N. W. Long,** product manager; and **T. R. Davis,** sales engineer. All will headquarter at the firm's main office and plant in Chicago. Mr. Hardy, a Goodman veteran in engineering and sales work, has been product manager. Mr. Long worked as application engineer specializing in belt conveyors, and Mr. Davis, until last year, worked exclusively on conveyors at Goodman.

H. Dillon Smith has been promoted to district supervisor, Mining Div., of Vascoloy-Ramet Corp. He will locate in

For LOADERS and CUTTING MACHINES

Guyan® SUPER RESISTORS

THE TREND toward super power and super capacity in machinery calls for SUPER RESISTORS to keep breakdowns at a minimum.

The GUYAN design takes full advantage of the space available in the resistor compartment to build a resistor of proper electrical resistance and high current capacity. The terminals are of heavy cast bronze, clamp type for rigid connections. And they are easily accessible and plainly stamped corresponding to the terminal markings on the original wiring diagram.

Available for all popular types of mining machines and loaders. No alterations necessary. Resistors are designed to fit original pockets of the machines. Write for complete information.

GUYAN MACHINERY CO.
LOGAN, W. VA.

Guyan® RESISTORS

MASTER MECHANICS CORNER:

Ted Combest, Master Mechanic in charge of the equipment spread for L. A. & R. S. Crow, General Contractors, El Monte, California, working in rock, sand and gravel on Highway U.S. 101 Project near Eureka, Calif.

"I've found through actual on-the-job experience that Cat cutting edges wear twice as long as other makes. We just can't afford to use any other make of edge."

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.
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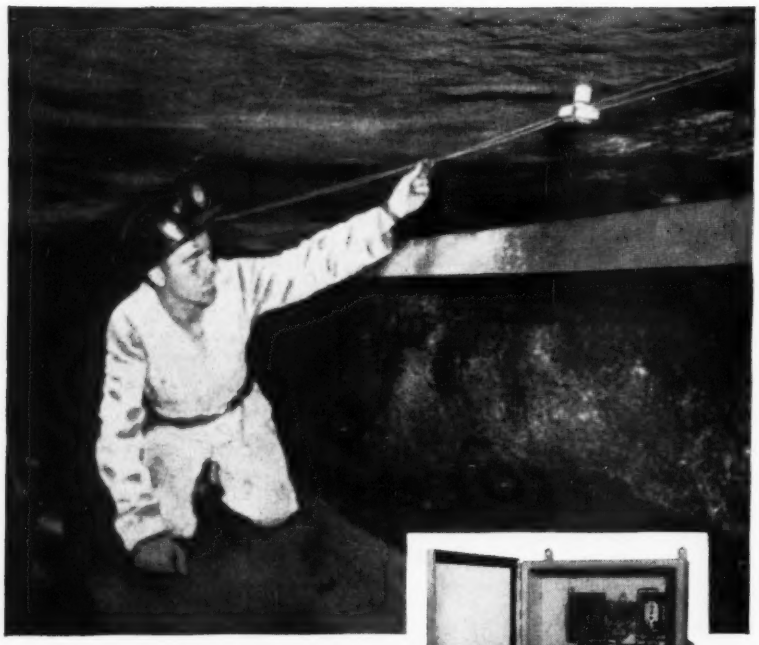
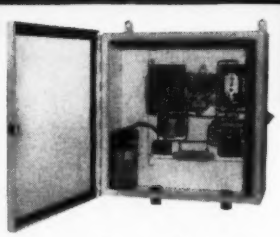
Ensigneer Belt Control
FOR BELT CONVEYORS





BULLETIN NO. 1125A

New improved design
FOR GREATER SAFETY

Ensigneer Control provides a simple method of alternately starting and stopping belt conveyor at any point along belt line by pressing together two bare contact wires.

A new feature is provided whereby if contact wires are tied together to stop conveyor for repairs or other reasons, intermittent power cannot restart the conveyor.

Enclosure contains two dry cells providing three volts for the contact wires in a circuit that is critically damped to prevent induced voltage on contact wires.

Request Bulletin No. 1125A

ENSIGN
ELECTRIC AND MANUFACTURING CO.
914 Adams Avenue Huntington 4, W. Va.

Manufacturers *(Continued)*

Bluefield, W. Va., and will be responsible for sales and service throughout the West Virginia, Virginia and eastern Kentucky coal fields.

Harnischfeger, large builder of construction and mining equipment, is decentralizing sales and dividing the United States into three major sales regions. Key personnel changes associated with the new plan are as follows: William J. DeHuff will head the western region, with headquarters in San Francisco; **J. C. Huntington Jr.,** will be in charge of the central and southern region, headquartered in Milwaukee; and **J. E. Laffey** will be responsible for the eastern region, with headquarters in Teterboro, N. J.

J. E. Carroll has been appointed sales manager by Continental Conveyor & Equipment Co. Mr. Carroll has been associated with Continental Conveyor's predecessor company, Continental Gin Co., since 1944, and has been district sales manager in Atlanta since 1951.

Barber-Greene Co. has announced reorganization in its field sales management set-up. The reorganization includes the appointment of several new regional sales managers and a field sales manager. Western Div. regional sales manager is **Ralph Dano,** who has over 36 yr of Barber-Greene service. Eastern Div. regional sales manager is **Kent Shell,** who has been in engineering and construction equipment for 14 yr. **Tom Benbow** has been appointed field sales manager. He has been with the company since 1937.

Charles C. Nolan has been named Western Dist. manager and Jack D. Power Central Dist. manager, for Hardinge Co., Inc. Both men are active members of the American Society of Mechanical Engineers.

Gordon Rowen Anderson, engineer and inventor holding 25 patents in the electrical field, has been appointed executive vice president, operations, at Fairbanks, Morse & Co. Mr. Anderson will have authority over divisional operations, including manufacturing, engineering and research.

William J. Loymeyer has been named manager of high-speed steel sales and Zane H. Markley sales engineer for carbide products, at Firth Sterling, Inc. Mr. Loymeyer will be responsible for marketing of the firm's high-speed steels while Mr. Markley will take charge of carbide and steel product sales in Utah, Colorado and northern New Mexico.

ALLEN & GARCIA COMPANY

49 Years' Service to the

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Authoritative Reports and Appraisals
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AERIAL PHOTOGRAPHS
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Cost Analysis — Valuations
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Drill Contractors Since 1902

Specialists in exploratory—grout hole and pressure groutings. Rigs located in over 50 strategic areas for prompt service. Free estimates.

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Exploration of Coal Properties. Guarantee satisfactory coal cores. Inside Mine Drilling. Pregrouting, Mine Shafts, Large diameter holes.
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Consulting Mining Engineers

Modern Mines Systems and Designs
Foreign and Domestic Mining Reports
Oliver Building—Mellon Square, Pittsburgh, Penna.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: "OPPORTUNITIES" :EQUIPMENT
BUSINESS: :USED OR RESALE

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. BOX 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITIONS VACANT

Mining Engineer to head engineering department of a group of mines of progressive Central Pennsylvania mining company. For appointment, state qualifications and experience, writing. P-3866, Coal Age.

Shaft Sinking Foreman—with experience in concrete lining and grouting. Take charge sinking two (2) shafts. Location—Far East. Status—Single. Contract—One (1) year. Salary—Open. Must be available June 1st. P-3837, Coal Age.

Diamond Drilling Foreman—must have had responsible charge of large drilling project, preferably with foreign experience. Location—Far East. Status—Single. Contract—One (1) year. Salary—Open. Must be available June 1st. P-3839, Coal Age.

SELLING OPPORTUNITY AVAILABLE

Nationally-Known, well established firm, seeks representative this area (either warehouse or individual) who now calls on mining industry to sell our line of mine roof plate washers. Write in detail, starting lines now handled and territory covered. RW-3763, Coal Age.

POSITION WANTED

Coal Mine Superintendent or Mine Foreman. Eighteen years experience in all phases of modern coal mining. PW-3794, Coal Age.

BUSINESS OPPORTUNITY

STRIP/COAL WANTED

Lease or purchase—large or small tracts. Morgan Coal Company, 2850 North Meridian Street, Indianapolis 8, Indiana.

EXPLOSIVES SALES

Excellent opportunity for young graduate engineer with explosives or mining experience to join the Industrial Chemicals Division of Spencer Chemical Company. The person selected will sell and promote the sale of prilled ammonium nitrate for its use as a blasting agent. This is a permanent position offering considerable opportunity to advance with an expanding organization.

In reply, please send resume of experience, education, age and salary requirements to:

Personnel Manager
Spencer Chemical Company
610 Dwight Building
Kansas City, Missouri

IMAGINATIVE ENGINEER

Eastern manufacturer has an interesting opportunity for an engineer as assistant to Director of Development Engineering. Projects will consist of developing and testing new types of crushing and allied machinery. Forward resume including educational and employment backgrounds. Our staff knows of this opening. Replies confidential.

P-3768 COAL AGE
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

MINE MACHINERY SALES

Excellent opportunity for graduate engineer to join major manufacturer of underground mining machinery for sales work in West Virginia. Man selected will have had thin seam mining experience, and will concentrate on sales of machinery to mines working such seams. Previous sales experience helpful but not mandatory.

Please send resume of experience, education, age, in full confidence to: **P-3773 Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.**

560 TONS PER 8 HOUR DAY WITH FOUR MEN

was the average production for a period of two successive months, 764 tons peak production and 365 tons average for three and one half years. This was the experience of the Allegheny River Mining Company using the equipment listed below as a Mechanical Highwall Mining Unit. Lack of available highwall makes the equipment available for sale.

76-A Jeffrey Colmol Continuous Miner, 440 Volt, A.C.; 30" Joy Extensible Belt Conveyor 1000 Ft. Self Propelled; 250 KVA. G.E. Generator 440 Volt, A.C. Diesel Driven; Loading, Pumping and Associated Equipment for a complete Mining Project.

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Phone Liberty 5-3521

New "SEARCHLIGHT" Advertisements

received by March 21st will appear in the April issue subject to limitations of space available.

Classified Advertising Division
COAL AGE
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Largest Supplier of the Best Rebuilt Mining Equipment

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1—48" CMI Dryer
1—48" McNally Pittsburg Cent. Dryer
1—Daniels Heavy Media Washer
1—36" x 104' Hot Material Handling Belt, Excellent
1—36" x 52' Hot Material Handling Belt, Excellent
1—30" x 60' Hot Material Handling Belt, Cleated, Like New
1—Approx. 50 ton Steel Bins, Like New
4—7' x 15' Single Deck Diester Tables
1—7' x 15' Double Deck Diester Table
1—4 Cell Jeffrey Baum Jig Washer, complete
1—Heat Dryer, Complete
1—36" x 36" Jeffrey Single Roll Crusher
1—36" x 33" Marion Double Roll Primary Crusher
2—30" x 36" Jeffrey Double Roll Crushers, Like New
1—30" x 30" Link Belt Double Roll Crusher
1—24" x 50" Pa. Single Roll Crusher
2—24" x 24" Jeffrey Single Roll Crushers
1—2' x 4' Williams Pulverizer
1—18" x 12" Jeffrey Swing Hammer Pulverizer
1—6' x 16' Allis Chalmers Double Deck Low Head Vibrator
1—6' x 16' Allis Chalmers Double Deck Ripl-Flo Vibrator
1—6' x 16' Triple Deck Robbins Gyrex Vibrator, Like New
1—6' x 16' Single Deck Allis Chalmers Low Head Vibrator, Like New
1—5' x 16' Double Deck Allis Chalmers Low Head Vibrator, Like New
1—5' x 16' Single Deck Allis Chalmers Low Head Vibrator, Like New
1—5' x 12' Allis Chalmers Triple Deck Low Head Vibrator
1—5' x 12' Allis Chalmers Ripl-Flo Double Deck Vibrator
2—5' x 10' Double Deck Robbins-Gyro Vibrators, Like New
1—4' x 12' Double Deck Vibrator
1—4' x 10' Selectro Double Deck Vibrator
1—4' x 8' Aero Vibrator, Single Deck
5—4' x 7' Jeffrey Traylor Double Deck Vibrators
2—4' x 7' Jeffrey Traylor Single Deck Vibrators
1—3' x 16' Single Deck Allis Chalmers Low Head Vibrator, Like New
1—3' x 8' Low Head Vibrator
1—30" x 72" Jeffrey Traylor Double Deck Vibrator
2—2' x 5' Leeco Single Deck Vibrators
9—24" x 90" Jeffrey Traylor Vibrators w/M.G. Sets
5—Jeffrey Traylor Vibrator Feeders
4—Jeffrey Traylor Vibrator Screens
1—Magnetic Separator, Complete
1—Set Jeffrey Dewatering Screens
5—Scraper Conveyors of various sizes
We can construct loading booms and tipple belts in any size.

BELT CONVEYORS

1—48" x 963' Link Belt, Belt Conveyor, w/100 h.p. Drive
1,080'—36" Model "C" Joy Belt Conveyor Structure
3—36" Model "C" Joy Belt Conveyor Drives
1—30" Jeffrey 52B Belt Conveyor, Tandem Drive, 25 h.p.
3—30" Goodman 97HC Belt Conveyor, Tandem Drive, 30 h.p.
4—30" 1,000' Goodman 99-5GT Belt Conveyors w/40 h.p. Tandem Drives
2—30" Joy MTB Tandem Belt Conveyor Drives
1—30" Shop Constructed Belt Conveyor Drive
288'—30" Barber Greene Belt Conveyor Structure
1—26" Jeffrey 52B Belt Conveyor, 800'
1—26" Jeffrey 52B Tandem Belt Conveyor
1—26" x 3,268' Joy MTB Belt Conveyor w/25 h.p. Tandem Drive
8,808'—26" Joy Model "C" Belt Conveyor Structure
19—26" Belt Conveyor Drives of various types

JOY TRACKLESS EQUIPMENT

4—11RU Joy Cutting Machines, 250 V., D.C. Permissible
11—10E-10 Joy Shuttle Cars, Permissible type
4—8SC Shuttle Cars, matched pairs, Elevating Discharge, Permissible Plates, Like New
17—8SC-3CE & 4E Joy Shuttle Cars
6—5SC Joy Shuttle Cars, w/Elevators
19—42E Joy Shuttle Cars
6—32E & 32D Joy Shuttle Cars
3—11BU Loaders, 250 V., D.C.
3—14BU-3PE Joy Loaders
5—14BU-7BE & 7RBE Joy Loaders, one rebuilt
6—14BU-2E Joy Loaders, 28" O.H.
4—12BU-9E & 7E Joy Loaders
4—8BU Joy Loaders, A.C. & D.C.
2—20BU1-3E Joy Loaders
9—T2-5E & T2-2E Joy Machine Trucks
2—T1-4G Joy Machine Trucks, 220 V., A.C.
8—PL11-7PE, 8PE & 14RE Joy Elevators
1—WK-83 Joy Compressor, 240 cu. ft., Rubber Mounted, Self-propelled
1—WL-82 Sullivan Compressor, 125 cu. ft., Rubber Mounted, Self-propelled
1—CD25 Joy Coal Drill, Perfect
1—Lot Joy Motors and Armatures—9J, 10J, 23J, 24J, Etc.

MISCELLANEOUS TRACKLESS EQUIPMENT

1—70-URB Jeffrey Cutting Machine
1—188-C Long Loader, Swing Boom, Like New
6—Long 88 & 88-C Pig Loaders
1—360 Goodman Loader on Rubber
2—Myers Whaley #83 Loaders
1—Lee Norse Jr. Continuous Miner
1—210 cu. ft. Acme Air Compressor
2—125 cu. ft. Acme Air Compressors
7—Manson Jeeps w/9J Motors
1—24BB Clarkson Loader

CUTTING MACHINES

1—70-URB Jeffrey Cutting Machine, 250V. DC
4—11RU Joy Cutting Machine w/Bugduster
2—29B Jeffrey Cutting Machines
1—29C Jeffrey Cutting Machine
1—824 Goodman Slabber
6—7AU Sullivans
5—7B Sullivans
16—11B Sullivans, 35 & 50 h.p., 250 V.
22—12AB, 12AA & 11 2AA Goodmans, 250 V.
9—212AA Baby Goodmans, 250 V.
9—512 Goodman Cutting Machines, w/Bugdusters, Hydraulic
2—512 Goodman Cutting Machines, 220 V. AC
1—712 Goodman Cutting Machine, 250 V. DC
1—29U Jeffrey, 220/440 V., A.C., Rebuilt
2—35L Jeffrey Cutting Machines
49—35B and 35BB Jeffreys, A.C. & D.C. Bugdusters and Trucks available

SUB STATIONS & TRANSFORMERS

1—Westinghouse A. C. Sub Station, 4500 KVA, 6900/2300, Complete w/boards, Excellent Condition
4—300KW M.G. Sets
5—200KW M.G. Sets
7—200KW, HCC6-1200, G. E. Rotary Converters, Automatic
5—150KW G. E. Rotary Converters, w/Transformers
1—150KW Westinghouse Rotary Converter, Completely automatic
15—150KW M.G. Sets of various makes and voltages
1—100KW M. G. Set
1—100KVA Gasoline Alternator Unit
2—50KW, M.G. Sets, 125 V., D.C., 1200 rpm
2—Armatures for 150 and 200KW Rotary
2—600 & 800 Auto Transformers
250—Transformers from 1½ KVA to 500 KVA

LOCOMOTIVES

1—20 Ton Jeffrey, MH77, 48" t.g., 6" armor plate frame, excellent condition
2—20 Ton MH77 Jeffreys, 42" t.g.
1—15 Ton HM828 G.E. Locomotive, 90 h.p. units, 44" O.H., 48" t.g., Excellent
1—14 Ton MH110 Jeffrey, 42" t.g.
7—13 Ton Locomotives, 250 V., any gauge
1—12 Ton 29B Goodman Locomotive, 40" O.H.
8—10 Ton Locomotives, 250 V., any gauge
14—8 Ton Locomotives, 250 V., any gauge
8—7 Ton Atlas Battery Locomotives
1—6 ton Battery Locomotive, New
30—6 Ton Locomotives, any gauge
3—6 Ton Jeffrey, MH150 Locomotives
14—6 Ton MH88 Jeffrey Locomotives
10—5 Ton Locomotives, 250 Volt
15—4 Ton Locomotives, 250 V., any gauge
1—4 Ton G. E. Battery Locomotive
2—4 Ton Mancha Battery Locomotives
1—4 Ton 828 G. E. Battery Locomotive

CHAIN & SHAKER CONVEYORS

3—20" Joy Chain Conveyors, Permissible
4—15" Joy Chain Conveyors, Permissible
8—15" Long Chain Conveyors, 350' centers w/400 DBH Long Mobile Head
1—15" Barber Greene Portable Chain Conveyor for unloading railroad cars
22—12" & 15" Jeffrey Chain Conveyors 61EW, 61HG, 61W and 61AM
1—12" Goodman 90L Chain Conveyor
2—PT12 Long Piggyback Conveyors
10—PT15 Long Piggyback Conveyors
62—Goodman Power Duckbills and Duckbill Hoists, Model 477G
60—Goodman G12½, G15 and G20 Drives
7—Joy Ladel UN17 Shaker Drives

MINE CARS

84—36" t.g. Drop Bottom Cars
161—42" t.g. End Dump Cars, various makes
260—42" t.g. S. D. Drop Bottom Mine Cars
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22—44" t.g. Drop Bottom Cars, 10 Ton
133—44" t.g. Drop Bottom Cars, various sizes
273—44" t.g. End Dump cars, vrious sizes
250—48" t.g. S.D. Drop Bottom Cars, 22" O.H.
2—56½" t.g., 3 Ton, 4 Wheel Push Trucks (NEW)

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4,000 —Tons, 30, 40, 56, 60, 65, 70, 80, & 90 lb. Relaying Rail
325'—2,000,000 CM Bare Copper Feeder Cable
550'—1,000,000 CM Insulated Aluminum
650'—1,000,000 CM Bare Copper Feeder Cable
6,500'—750,000 CM Copper Insulated, Excellent
500'—350,000 CM Copper Feeder Cable, Insulated
500'—4/0 Stranded Copper, Insulated
2,000'—2/0 Stranded Copper, Bare
2,000'—3/0, 3 Cond., 15,000 Volt Insulated Cable, Like New
5,000'—2/0, 3 Cond. Anhydrex & Lead Covered Cable
117,520'—2/0, 1/0, #1, #2, #4, & #6 Solid Copper Highline Wire
750'—4/0 Fig. 8 Trolley Wire
315'—4/0 Round Trolley Wire
1,000'—6/0 Fig. 8 Trolley Wire
1,660'—9 Section Trolley Wire
Several thousand ft. #2, #3 & #4 approved type machine cable.

MISCELLANEOUS

1—Canton Track Cleaner, Excellent
15—HKL, HKG, HKD & CH Brown Fayro & Sullivan Hoists
1—WK29 Sullivan Air Compressor, 120 cu. ft.
2—Cantrell Compressors, 120 cu. ft.
22—Air Compressors of various sizes
1,270—Edison Lamps, Model P and R4
57—Auto Starters from 3 h.p. to 100 h.p.
90—Hoists from 5 h.p. to 800 h.p.
6—Shop Constructed Jeeps, track mounted
950—Stationery Motors—½ to 800 h.p. AC & DC
1—Prefab Building, 14'8" x 16'
148—Pumps from ¾" to 4500 GPM
102—Coal Drills, various makes, and sizes
1—10 h.p. Deming Deep Well Pump
1—330 GPM, 6" Pomona Deep Well Pump
1—14" Centrifugal Slurry Pump
32,688'—Pipe; galvanized, plastic & cast iron
47—Room Blowers, Brown Fayro & Jeffrey
43—Mine Fans from 30" to 6' Hi Pressure
15—Battery Chargers, various voltages
6—Cleveland Stopers
13—Scales for Mine Tracks
10—Rock Dusters up to 30 h.p., track and rubber mounted
1—Dust Collector for Roof Bolting
1—Jet Creter Model CMC, Like New
1—Phillips Shuttle Car Carrier, New
2—Phillips Joy Carriers, Excellent
1—42 Ton Richards Truck Scale, 10' x 25' Deck
1—8' Stearns Magnetic Separator, Like New
SHOP MACHINERY: Lathes, Drills, Grinders, Welders, Shapers, Presses, Milling Machines

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BECAUSE of our Fair Dealing with the Public J. T. FISH sells more Mining Equipment at the lowest prices anywhere!

WE BUY—SELL—TRADE

JOY EQUIPMENT—REBUILT

3—Joy 14BU Loaders, low pedestal, 7AE, 1956 & 57.
6—Joy 14BU Loaders, medium pedestal, 7RBE.
4—Joy 14BU 3PE Loaders.
2—12BU10E Joy Loaders complete with Piggybacks.
2—Joy 12BU Loaders, 9E, latest type.
1—Joy 20BU Loader, latest type.
2—Joy 11BU Loaders, latest type.
1—Joy 8BU Loader, 34″ overall height.
2—Joy 8BU Loaders, 220 V. AC.
1—Joy curved Bar Head, complete.
6—Reliance 24-J Motors, 7½ H.P.
10—Reliance 38-J Motors, 10 H.P.
20—9-J Motors, 4 H.P.
2—Goodman 660 Loaders on Crawlers 440 V. DC, like new.
1—Goodman 660 Loader on Crawlers, excellent 250 V. DC.
1—Goodman 665 Loader on Crawlers, latest type 250 V. DC.
1—Goodman 865 Loader, 26″ hi. Rebuilt. 250 V. DC.
4—Joy 8SC Shuttle Cars, rebuilt.
4—Joy 6SC Shuttle Cars, rebuilt, latest type.
1—Joy 5SC Shuttle Car. Excellent.
2—Joy 32E9 Shuttle Cars.
2—Joy 32E10 Shuttle Cars, rebuilt.
2—Joy 32E15 Shuttle Cars, rebuilt.
4—Joy 32E16 Shuttle Cars, rebuilt.
2—Joy 42E16 Shuttle Cars, rebuilt.
2—Joy CD-22 Drills, on rubber, like new
6—Joy T-2-5 low pan Crawler Trucks, rebuilt.
1—Joy T-2-6 low pan Crawler Truck with reel.
2—Joy T-1 Standard Crawler Trucks, 220 AC.
1—Joy T-1 Standard Crawler Truck, 250 DC.
2—Goodman low pan Crawler Trucks, like new, latest type.
4—Joy 11-B Cutting Machines, like new, 35 & 50 H.P.
1—Joy 7-B Cutting Machine, like new, 250 V. DC.
2—Goodman 212 Cutting Machines, 19″ high.
4—Goodman 312 Cutting Machines, 17″ high.
3—Goodman 412 Cutting Machines, 19″ high.
1—Goodman Machine on Crawler, 31″ high. All hydraulic.
6—Goodman 512 Machines with Bugdusters.
6—Goodman 612 Cutting Machines, 250 and 500 volt.
1—Lee Norse low vein Machine Carrier on rubber.
1—Jeffrey 70 URB rubber tired Cutter, Universal head, perfect condition.
1—Joy 11RU Rubber Tired Cutter with bugdusters, Universal heads, like new. 250 V. DC.
1—Goodman rubber tired Universal Cutter, new 1959. Excellent.
2—Joy 10RU Rubber tired Cutters, Universal head, 220/440 V. AC. Perfect.
6—7AU's on track. Universal head.
2—Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38″ high, on Crawlers, 250 volt DC.
1—Jeffrey 29LC on Crawlers, rebuilt.

LOCOMOTIVES

1—Goodman 6 ton, 93-A, 27″ high, armor plate frame.
1—Jeffrey 15 ton MH-77 Locomotive, armor plate frame.
3—Jeffrey, 13 ton, type MH-110, 36″, 42″, 44″ ga.
2—Jeffrey, 10 ton, type MH-110, 42″ and 44″ ga.
2—Jeffrey, 10 ton, type MH-78, 42″ and 44″ ga.
2—Goodman 8-30 and 10-30 Locomotives, 26″ above rail.
1—Jeffrey MH-124, 6 ton, 24″ overall height.
12—Jeffrey, 6 ton, type MH-88, 42″, 44″ and 48″ ga.
4—Jeffrey 8 ton, type MH-100 2½″ armor plate frames.
1—Jeffrey, 6 ton, type 2186, 22″ above rail.
3—Jeffrey, 4 ton, type MH-96, 42″, 44″, 48″ ga.
1—G.E., 4 ton, type 825 Locomotive, 22″ high.
10—G.E., 6 ton, types 801, 803, 821 Locomotives, 42″, 44″ and 48″ ga.
1—G.E., 8 ton, type 822 Locomotive, 44″ ga.
3—G.E., 10 ton, type 809 Locomotives, 42″, 44″ and 48″ ga.
2—Goodman, type 33, 6 ton, 44″ and 48″ ga.
3—Westinghouse, type 902, 4 ton, 42″ and 48″ ga.
2—Atlas Battery Locomotives 36″ ga.
1—Atlas Trolley Locomotive, 4 ton, 24″ high.
2—Westinghouse, type 904, 6 ton, 44″ and 48″ ga.
2—Westinghouse, type 906, 44″ and 48″ Ga.
2—Westinghouse, type 907, 10 ton, 44″ and 48″ Ga.
8—Jeffrey MH-78 Locomotive Units, cheap.
4—Jeffrey MH-88 Locomotive Units, real bargains.
6—Jeffrey MH-100 Locomotive Units, reasonable.
3—Plymouth Diesel Locomotives, 8 and 10 tons, 42″ and 44″ Ga.
Locomotive Trucks and Spare Armatures for all the above.

TIPPLE EQUIPMENT

1—Complete Five Track Tipple with Washers and Air Tables.
2—Complete Tipples, 3 & 5 track, steel and wood.
3—Cleaning Plants, 1 Ea. McNally, Roberts and Schaefer, Jeffrey, Washers and Air-Flo Tables.
4—Complete Aerial Trams for coal or refuse.
3—Complete Rope and Button Lines.
2—Monitor Lines complete with Drums, excellent.
1—Allis-Chalmers 5′ x 12′ Rippflo Vibrator.
1—Allis-Chalmers 4′ x 12′ Low-Head Vibrator.
1—Robins Gyrex Vibrator, 4 x 10.
10—Belt and Apron type Loading Booms.
6—Shaker Screens.
1—Robins Car Shakeout.
20—Crushers, various sizes—Jeffrey, McClanahan & McNally.
4—Mine Scales, 10 & 20 ton.
5—Truck Scales, 25 to 40 ton, late type.
Feeders, Belt and Drag Conveyors, Car Retarders, etc.

CUTTING MACHINES

2—Joy 10RU rubber tired Cutters, Universal Head, 220/440 volt AC. Perfect
1—Joy 11RU, rubber tired Cutter, 250 V. DC.
1—Goodman rubber tired Universal Cutter, new 1956. Excellent.
1—Jeffrey 70 URB Cutter, rubber tired, Universal Head, low vein.
2—Jeffrey 29UC Universal Machines on Crawlers.
1—Goodman on Crawlers, 31″ overall height.
3—Baby Goodman 212's, rebuilt, 250 V. DC.
2—Goodman 212 Cutting Machines, 19″ high.
4—Goodman 312 Cutting Machines, 17″ high.
3—Goodman 412 Cutting Machines, 19″ high.
6—Goodman 512's, with Bugdusters, like new.
4—Goodman 512's, rebuilt, or as removed from service.
3—Goodman 112's, 220/440 V. AC.
1—Joy 7-B Cutting Machine, 250 V. DC.
4—Joy 11B Cutting Machines, rebuilt, 35 & 50 H.P.
6—7AU's, on track, Universal Head.
10—Goodman 12AA's and 112AA's, 250 V. DC.
2—Goodman 324 Slabbers.
2—Goodman 724 Slabbers.
2—Goodman 824 Slabbers.
6—Jeffrey 35L's, like new, 17″ high.
2—Jeffrey 35L's, on low vein trucks.
15—Jeffrey 35B's and 35BB's.
2—Jeffrey 29B's on track.
10—Jeffrey 29C's, track mounted.
2—Jeffrey 29L's, on Crawlers. Excellent.
3—Sullivan CE7, 220 AC.

CONVEYORS

2—Robins 36″ tandem drives, with or without structure.
2—Joy 30″ Underground Belt Conveyors, Excellent.
1—Goodman 97-C, 30″ Conveyor, 1500′ long.
2—Goodman 97-C, 26″ Conveyors, 1,000′ long.
1—Robins 30″ Belt Conveyors, 1000′.
1—Jeffrey 52-B, 36″ Drive and Tail Assembly, complete.
2—Joy MB2 30″ Drive and Tail Assembly, complete.
2500—Conveyor Belt, 36″.
500—Conveyor Belt, 30″.
2000—Conveyor Belt, 26″.
8—Jeffrey 61AM 12″ Chain Conveyors, 300′.
2—61EW Elevating Conveyors.
2—61WH 15″ Room Conveyors, 300′.
2—Joy 15″ Room Conveyors, 300′.
2—Joy 20″ Conveyors, 300′.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.
1,000′ Goodman 18″ Flat Belt Conveyors, tandem drive, any length. Perfect.

CONVERTERS AND DIESEL PLANTS

1—300KW Portable Rectifier, 3 car unit, excellent.
2—500KW G.E. Stationary Rectifiers.
4—1,000KW Stationary Rectifiers.
2—100KW, G.E. TCC-6's, 275 V., Rotary Converters.
1—150KW, G.E. HCC-6, 275 V., Rotary Converter.
1—150KW, 6 phase, Allis-Chalmers Rotary Conveyor, 275 V. D.C.
2—200KW G.E. HCC-6's, Rotary Converters, 275 V. DC. Newly rewound.
3—300KW G.E. HCC-6's, Rotary Converters, 275 V. DC. Like New.
2—300KW Westinghouse, 6 phase, Rotary Converters, 275 V. DC.
2—500KW Westinghouse Rotary Converters, 275 V. DC.
2—200KW Westinghouse Rotary Converters, 275 V. DC. Newly rewound. (Al the above with 6900/13000 and/or 2300/4000 primary transformers)
2—100KW MG Sets, 275 V. DC.
2—150KW MG Sets, G.E. and Westinghouse, 275 V. DC.
1—200KW MG Set, Westinghouse, rebuilt, 275 V. DC.
1—200KW MG Set, G.E., perfect, 275 V. DC.
2—300KW G.E. MG Sets, like new.
1—300KW Westinghouse, 600 volt MG Sets, rebuilt.
1—300KW Westinghouse, 600 volt MG Set, re-Converters.
2—500KW Westinghouse, 600 volt, DC, 6 phase, Rotary Converters.
2—500KW HCC-6's, Rotary Converters, 6 phase, 600 V. DC.
1—GMC-471 Diesel with 60KW, 250 V. DC Generator.
2—GMC-671 Diesels with 75KW, 250 V. DC Generator.
1—Cummins 125KW Diesel with 250 V. DC Generator.
1—Allis-Chalmers Natural Gas Engine with 100KW Generator, 275 V. DC.
Boilers, like new, 500 H.P.

LOADING MACHINES

16—Joy Loaders, 14BU, 12BU, 8BU, 11BU, 20BU
3—Joy 12BU9E Loaders, latest type.
2—Joy 12BU with Piggyback Conveyors.
2—Goodman 865 Loaders, 26″, on Crawlers.
1—Goodman 665 Loader, on Crawlers.
2—Goodman 660 Loaders, 440 V. AC, perfect.
1—Goodman 660 Loader, on Crawlers.
1—Goodman 460, on track, Rebuilt.
2—Jeffrey 61 CLR's on rubber, 26″.
3—Jeffrey L-500 Loaders.
2—Myers Whaley, No. 3 Automatic Loaders.
2—Clarkson Loaders, 26″ above rail.

MISCELLANEOUS

1—Complete Five Track Tipple with Washers and Air Tables.
5—Complete Tipples, 3 to 5 Track. Wood and Steel.
Steel Bins for drop bottom cars.
All Steel Armco Buildings
20—Jeffrey Molveyors on rubber tires.
1—¾ Yard Shovel and Back-Hoe.
1—¾ Yard Crawler Crane.
Battery Supply Tractors, Rubber tired.
1—Cantrell Air Compressor on rubber tires.
10—Air Compressors, 1 H.P. to 40 H.P.
2—Joy self-propelled rubber tired compressors. 240 cu. ft.
2—Acme Self Propelled rubber tired compressors, 130 cu. ft.
40—Mine Pumps, all types.
1—Differential 40 Passenger Man-Trip Car.
6—MSA Rock Dusters.
2—Phillips Carriers, 44″ and 48″ ga.
1—Barber-Greene self-propelled Bucket Elevator.
Pipe, Plastic, Steel, Transit, all sizes 1″ to 6″.
300—Mine Cars, drop bottom, 42″ ga.
90—Mine Cars, drop bottom, 44″ ga.
50—Mine Cars, drop bottom, 48″ ga.
100—Mine Cars, 18″ high, end dump, 44″ ga.
300—Mine Cars, end dump and drop bottom, 20″ high, 48″ ga.
1—10 ton Mine Car Scale with Recorder.
15—Brown Fayro HKL and HG Car Spotters.
1—Brown Fayro Hydraulic Car Spotter.
1—12 ton Differential Slate Larry.
Incline Hoists, 25 to 50 H.P.
1—Jeffrey 5′ Aerodyne Fan, like new.
1—Jeffrey 6′ Aerodyne Fan.
2—Storage Tanks, 4,000 Gallons.
2—Storage Tanks, 10,000 Gallons.
10,000 Five Gallon G.I. Cans, screw lids.
2,500 tons Relaying Rail, 25lb., 30lb., 40lb., 50lb., 60lb., 70lb.
30 Tons Copper—4/0 and 9 Section Trolley 1/0, 2/0, 4/0 Stranded.
Thousands of feet of rubber covered three conductor cable. All sizes.
300—Transformers from 1 to 300 KVA, 110 to 13,000 primary volts.
400—Electric Motors, 3 to 250 H.P.
Huge Stock of Mine Supplies
600—MSA Mine Lamps, Chargers, etc.
4—Mine Scales, 10 & 20 ton.
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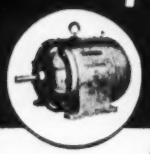

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100	West. S.B. Open	SK-170	900
75	West. S.B. Open	SK-140L	1800
75	West. S.B. Open	SK-160	900
60	G.E.B.B. Drip	CDM-65	1800
60	Al. Chal. S. B. Drip	DE-131	1200
45	G.E.S.B. Open, Shunt	RC-14	1200
40	Century B.B. Drip-New	DN-375	1800
30	West B.B. Drip New	SK-93	1800
25	West. S.B. Open	SK-100L	1200
25	G.E.B.B. Shunt	CD-93	1200
10	G.E.B.B. Splash	CD-85	1800
10	West. B.B. Drip.	CSP-324	1800
7½	G.E. T.E.F.C. B.B. New	B-284	1800
5	L.A.B.B. Drip	OGNA-254	1800

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9-W B.E. Diesel Drag, 165', 12 yd.
7-W B.E. Diesel Drag, 140', 7 yd.
7400 Marion Diesel Drag, 175', 13 yd.
71-B B.E. Crane with 160' boom
625 Page Diesel Drag, 150', 10 yd.
621-S Page Diesel Drag, 125', 7 yd.
200-W B.E. Diesel Drag, 125', 6 yd.
2400 Lima Elec. Drag 130', 6 yd.
2400 Lima Diesel Drag, 130', 6 yd.
5-W B.E. Diesel Drag, 100', 6 yd.
88-B B.E. Comb. Shovel Drag, w/100' boom
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5560 Marion 26 yd. Elec. Shovel
5480 Marion 18 yd. Elec. H. L. Shovel
151-M Marion 7 yd. Elec. Shovel
170-B B.E. 6½ yd. Elec. Shovel
4161 Marion 6 yd. Elec. Shovel
2400 Lima 4½ and 5½ yd. H.L. Shovels
120-B B.E. 4 yd. Elec. Shovel
4500 Manitowoc 5 yd. H. L. Shovel
1201 Lima 3½ yd. Standard Shovel
111-M Marion Standard & H.L. Shovels
3500 Manitowoc Standard & H.L. Shovels
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2—512 Goodman Machine with Duster AC
3—400L Long Conveyor complete
2—212A Goodman Cutting Machine
3—35L Jeffrey Cutting Machine
1—600 Ton Steel Bin Like New

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3—750 KW 600 volt 1200 RPM Westinghouse Serial Number over 8 Millions Fabricated Based
1—500 KW 600 Volt 1200 RPM Westinghouse
2—500 KW Westinghouse 250/275 volt 1200 RPM
1—300 KW Westinghouse 1200 RPM
2—300 KW G.E. HCC6 Form P 1200 RPM
2—200 KW G.E. HCC6 Form P 1200 RPM
2—150 KW Westinghouse 1200 RPM
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2—100 KW Westinghouse 1200 RPM
Transformers any voltage for above switching gear, & panel boards.
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1,000,000 ft. 3"	7.70¢	
1,000,000 ft. 4"	10.98¢	
500,000 ft. 6"	19.80¢	
200,000 ft. 8⅝"	28¢	
400,000 ft. 10¾"	35¢	
75,000 ft. 12¾"	40¢	
10,000 ft. 16"	42¢	

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One 7 A.U.-Universal cutting machine

Permissible type

For 220 Volt A.C., 42" gauge

Century Coals Limited
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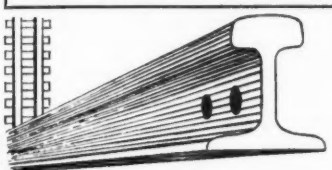

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A.C. MINING EQUIPMENT FOR SALE
2—11BU-10APH Joy Loading Machines, 220/440 Volts A.C.
1—8BU-11G Joy Loading Machines, 220 Volts A.C. (can be changed to 440 Volts A.C.)
2—4JCM Joy Continuous Miners, 440 Volts A.C.
1—10RU Joy Cutting Machine, 220/440 Volts A.C.
1—512 Goodman Cutting Machine, 220/440 Volts A.C.
3—7B Sullivan Cutting Machines, 220/440 Volts A.C.
1—8BU Joy Loading Machine, 220 Volt AC, 31" high, equipped with stub boom for PT-12 Piggyback
1—T-1 Joy Machine Truck, AC.
1—T2-5 Joy Machine Truck, AC.

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1—18 HR Joy Loading Machine, 250 Volts D.C.
4—11 BU-10APE Joy Loading Machines, 250 Volts D.C.
1—11 BU-11APE Joy Loading Machine, 250 Volts D.C.
2—14 BU-7BE Joy Loading Machines, 250 Volts D.C.
2—14 BU-3PE Joy Loading Machines, 250 Volts D.C.
6—12 BU-9E Joy Loading Machines, 250 Volts D.C.
3—8 BU Joy Loading Machines, 250 Volts D.C.
3—7 BU Joy Loading Machines, 250 Volts D.C.
2—Long 12" Piggyback Conveyors, each 300' long, complete with PT-12 Piggybacks and 12BU Joy Loading Machines.
1—11BU-14E Joy Loading Machine, 250 Volt DC, 75 H.P. Main Motor, Serial No. 5803.

SHUTTLE CARS FOR SALE
2—10SC-1E Joy Shuttle Cars, 250 Volt DC, completely modern.
1—570-48 Goodman Shuttle Car, 250 Volts, D.C.
4—5SC Joy Shuttle Cars, Matched Pair, Elevating Discharge, Disc Brakes, 250 Volts D.C.—Modern.
2—6SC-7E Joy Shuttle Cars, Matched Pair.
2—6SC-5E Joy Shuttle Cars, Elevating Discharge, 4-Wheel Steering, 250 Volts D.C.
3—42E18 Joy Shuttle Cars, Disc Brakes, Elevating Discharge, Completely Modern, 250 Volts, D.C. 2-Standard, 1-Opposite Standard Drive.
1—42E15A Joy Shuttle Car.
1—32 E-7 Joy Shuttle Car.

CUTTING MACHINES FOR SALE
1—512 CJ Goodman Cutting Machine, 50 H.P. with bugduster.
1—11RU Joy Cutting Machine, 250 Volts D.C. with 9' Cincinnati Bar, Chain and bugduster.
1—10RU Joy Cutting Machine, 250 Volt D.C. with bugduster.
2—29UC Jeffrey Universal Cutters, Permissible, 250 Volts D.C.
1—512 CCH Goodman Cutting Machine, 250 Volts D.C.
5—35B Jeffrey Cutting Machines, 250 Volts D.C.
6—35BB Jeffrey Cutting Machines, 250 Volts D.C.
1—35 LC Jeffrey Cutting Machine, 35 H.P.
2—29LC Jeffrey Cutting Machines, 250 Volt D.C.
2—512 EJH Goodman Cutting Machines
2—512DA Goodman Cutting Machines, 250 Volts D.C.
2—7AU Sullivan Cutting Machines, 250 Volts D.C.
3—212 AB Goodman Machines.
2—412 AA Goodman Machines.
1—35L Jeffrey Machine 35 H.P.

CONTINUOUS MINERS FOR SALE
3—4JCM Joy Continuous Miners, 440 Volts A.C.

RECTIFIERS FOR SALE
1—150 KW General Electric Stationary Rectifier, 440 Volts Primary, 275 Volts D.C., Serial No. 6628.

ROTARY CONVERTERS FOR SALE
1—300KW Westinghouse, Pedestal Type Converter, 275 Volts D.C., Primary 2300/4000.
1—100 KW General Electric HCC-6 Rotary Converter, 1200 RPM, 2300/4000 Volts Primary, 275 Volts DC, Pedestal Type.
1—150 KW Westinghouse Rotary Converter, Pedestal Type, 1200 RPM, 2300/4000 Volts Primary, 275 Volts DC.
1—200 KW General Electric HCC-6 Rotary Converter, 1200 RPM, 2300/4000 Volts Primary, 275 Volts DC, Pedestal Type.

COAL DRILLS FOR SALE
25—CP-472 Electric Coal Drills, 250 Volts D.C.
5—CP-572 Coal Drills.
1—Chicago Pneumatic RBD-30 Roof Drill, Serial No. A858913.
10—Chicago Pneumatic Little Giant 572 Coal Drills, 3 phase, 220 Volt AC Permissible. New.

CRUSHER FOR SALE
1—36" x 36" Double Roll Crusher, complete with 100 H.P. Motor.
1—18" x 30" Double Roll, Double Drive, Scottdale Crusher.
1—Cedar Rapids 20" x 30" Swing Hammer Crusher with 40 H.P., 220/440 Volt AC Motor.
1—Robins 36" x 36" Double Roll Stoker Crusher, specially built with spike teeth equipped with extra set of new segments.
1—Scottdale 20" x 30" Double Roll, Double Drive Crusher.

COMPRESSORS FOR SALE
3—Acme Self-propelled Air Compressors, 83R, Model 168, Capacity 176CFM, with 40 H.P. Reliance Compound Motor. Excellent Condition.

LOCOMOTIVES FOR SALE
1—10 Ton Goodman Locomotive, Serial No. 4371—Type 32AO4-T, 250 Volt D.C., 42" track gauge. Height 34".
1—MH-150 Jeffrey Locomotive, 42" track gauge, 250 Volt D.C., 26½" high, rebuilt.
1—MH-88 Jeffrey Locomotive, 30" high with CY-21 Reel, 44" track gauge.
1—General Electric 6 Ton Locomotive with Reel, 36" gauge.
1—1030 Goodman Locomotive, 24" high, 44" track gauge.

ROCK DUSTERS FOR SALE
1—MSA Track Mounted Rock Duster, 10 H.P., A.C. or D.C., high pressure, 30" high, any gauge.
2—MSA Bantam Rock Dusters, Rubber Tired, Portable.
2—MSA Bantam Rock Dusters, Skid Mounted.
1—American Mine Door, Wheel mounted bantam type rock duster, 250 Volts D.C., 22" high.

HOISTS FOR SALE
10—#11½ Vulcan-Denver Material Hoists, Complete with 3 H.P. D.C. Compound Wound 1750 RPM General Electric Motor.
2—Brownie Hoists, Model HKL—Good condition.
1—Brownie Hoist, Model HKM—Good condition.
3—Sullivan Type CHL 5 H.P. Car Spotting Hoists.

ELEVATORS FOR SALE
1—PL11-14 Joy Elevator.
2—Joy PL11-16 Elevating Conveyors.

MACHINE TRUCKS FOR SALE
2—T2-5APE Joy Trucks, 250 Volts D.C. Permissible.
1—T2-5APE Joy Machine Truck, 250 Volt D.C. equipped with hydraulic system for drill.

CHAIN CONVEYORS FOR SALE
5—61AM Jeffrey Chain Conveyors, 10 H.P. 300' long.
3—61HG Jeffrey Chain Conveyors, 5 H.P. 40' long.
700 ft. Goodman 30", 97C Structure complete with drive.
1—Jeffrey 300 ft. 15" Chain Conveyor.

DIESEL PLANTS FOR SALE
1—60 KW, G.M. Diesel Generator Set, with 60 KW, 250 Volt D.C. Delco Generator.
1—100 KW Waukesha Diesel Generator with 220/440 Volts D.C.
1—100 KW Diesel Generator Unit, with G.M. Diesel Engine and 100 KW Generator.
1—D13000 Caterpillar Diesel Generator Unit—with Caterpillar engine and 75 KVA G.E. generator self-regulating, 220 Volt A.C.
1—250 KW Diesel Generating Plant, consisting of Westinghouse 250 KW 275 Volt Compound Wound Generator driven by Twin 6110 General Motors Engines, Complete with switchgear and all appurtenances. New in 1956.

MOTOR GENERATORS FOR SALE
1—50 KW Westinghouse MG Set, 440 Volt AC, 250 Volt DC.
1—300KW Westinghouse Motor Generator Set, synchronous motor, 433 KW Output, 435 KVA, 2200 Volts, 1200 RPM. D.C. generator 300 KW, 275 Volts, 1200 RPM. Compound Wound. Complete with D.C. panel and switch gear.
3—50 KW G.E. and Westinghouse Motor Generator Sets, 2300 Volts A.C., 275 Volts D.C. Complete with switching gear.
1—200 KW Ridgeway Motor Generator Set, Complete with switchgear and 1600 amp. I-T-E automatic circuit breaker, 2300 A.C., 275 Volts D.C.

BELT CONVEYORS FOR SALE
2 only 1200' 26" Belt Conveyors with 30 H.P. 250 Volt D.C. Drives.

MISCELLANEOUS FOR SALE
3—35B Jeffrey Armatures, 250 Volts DC.
4—902, 250 Volts D.C. Westinghouse Motor Units, only.
1—R5E Jeffrey Reel and Motor, complete.
1—PL 11-14 Joy Elevator.
10—Goodman 512 Cutter Bars and Chains.
208—AC&F 42" Gauge, 48" high Drop Bottom Mine Cars. Condition like new.
1—24" Fan with drive.
2—7½ H.P. Tricycle Type Rubber Tired Mine Tractors, 7½ H.P. 220 Volt Single Phase Motors or 250 Volt D.C. Motors.
3—24 J Motors, 7½ H.P., 250 Volt D.C.
3—75 KVA Transformers, 2300/4000 Wye to 220 Volts.
2—42" Track Gauge Phillips Carriers.
2—Manson Mine Jeeps 40" Track Gauge equipped with 9J Motors.
1—5 x 16 Hewitt Robins Vibrating Screen.

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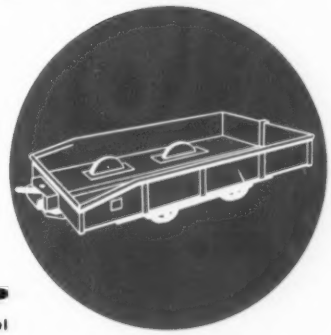
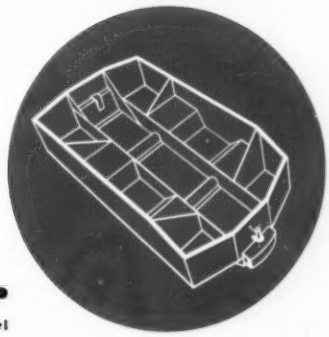
DROP BOTTOM
4 wheel or 8 wheel



END DUMP
4 wheel



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4 wheel or 8 wheel

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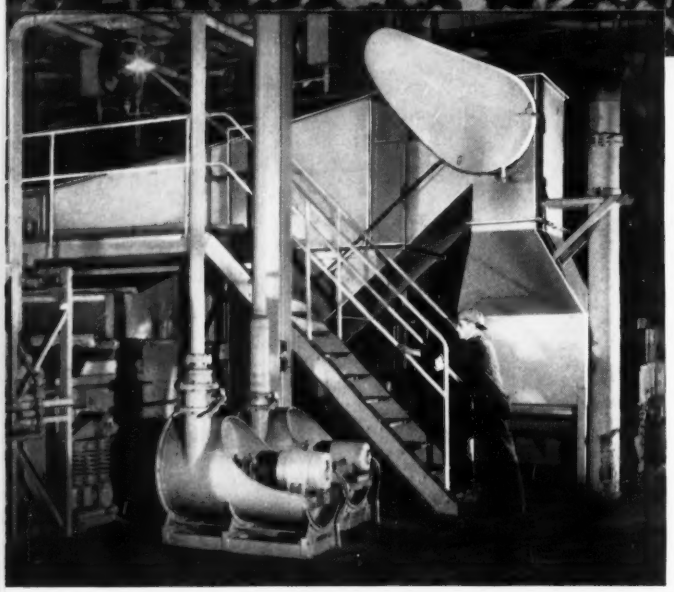

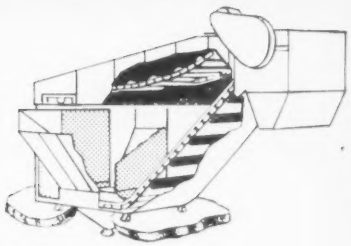

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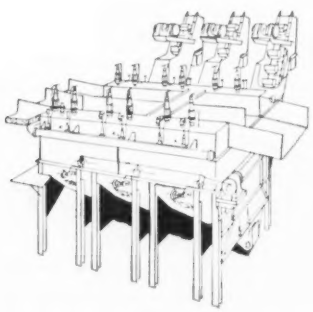
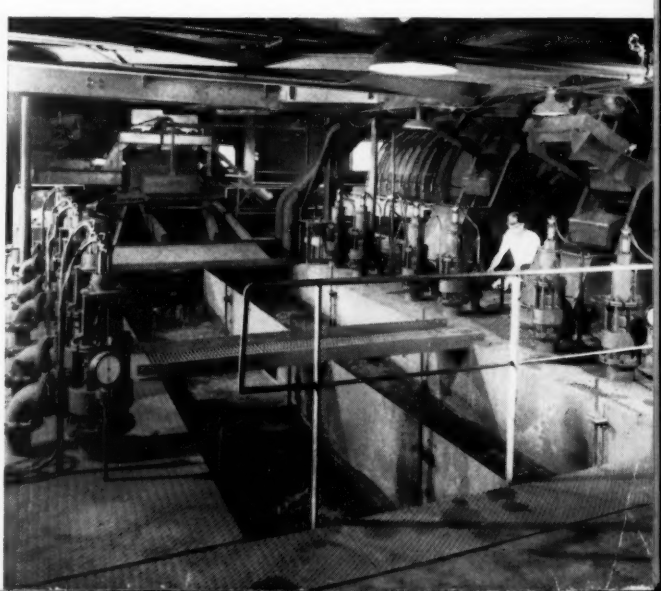


AT JOANNE

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